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## INCOME INEQUALITY OF WIELKOPOLSKA PROVINCE COMMUNES IN 2005–2015

**Abstract.** The study aimed to evaluate income inequalities of the Wielkopolska province communes in 2005–2015 across to their administrative types. First, own income levels of the province communes were assessed against the national averages, followed by inequality estimated with the Gini, Theil, quintile share and decile ratio measures. Attention was also given to the Theil decomposition of the inequality into contributions associated with administrative types. Research drew on data published by the Central Statistical Office in the Local Data Bank (Public Finance).

**Keywords:** income inequality, Gini index, Theil index, quintile share ratio, communes

### INTRODUCTION

Decentralization of local government entrusts specific areas of the public domain to particular levels of local administrative units (Wyszkowska and Wyszkowski, 2015). At the lowest level in the administrative hierarchy, the communes perform the widest range of tasks among all the tiers of local administration. This results from a better knowledge of the needs of local communities, from the range of competencies and from the freedom of pursuit of economic activities by the communes' local governments (Kotlińska, 2012; Surówka, 2004). The implementation of the tasks requires incurring expenses, so the communes have been equipped with specific sources of income along with strictly defined powers in order to shape and adjust some of these resources (Jastrzębska, 2012).

The high level of own income per capita (and its high share in total income) is of great importance for

the communes' performance, especially for their own activities related to the satisfaction of inhabitants' needs, improvement of their living standards and promotion of a stable local development (Surówka, 2013). However, the communes' income potential, expressed in terms of their own income, can vary considerably. Kachniarz (2011) draws attention to the key role of the geographic rent, which can heavily influence the development of the local economy, regardless of the institutional merits of the commune itself, when it "becomes merely the beneficiary of this development" (in the form of increased income). Research by Głowicka-Wołoszyn et al. (2017b) conducted for the communes of Wielkopolska province and Kozera and Głowicka-Wołoszyn (2017) conducted for the four largest metropolitan areas in Poland confirm this thesis, pointing to the surrounding large urban metropolitan area as one of the main determinants of the high level of own income. Communes located in the

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first and second zone around a metropolis (regardless of their administrative type) form clusters of high values of own income. The study also points out the important role of spatial conditions, which arise with the geographical distribution of natural resources (e.g. coal or copper deposits), areas of natural beauty (e.g. mountains, lakes), and with sound economic growth related to these conditions. Another factor differentiating communes' income opportunities is their administrative type. Empirical studies (cf. Heller, 2006; Głowicka-Wołoszyn et al., 2017a; Głowicka-Wołoszyn et al., 2018) indicate that own income varies between these types and confirm the opinion that the level of own income in rural communes is the lowest. At the same time, however, they emphasize substantial diversity of income potential within rural communes – some of them are located in the sphere of influence of large urban centers and undergoing profound transformations towards a true multi-functionality; others are lingering on the periphery of this sphere and are still predominantly agricultural in character (cf. Głowicka-Wołoszyn et al., 2018; Heller, 2006; Stanisławska and Głowicka-Wołoszyn, 2017; Wołoszyn et al., 2016). Apart from endogenous or local factors, the income potential of communes and its distribution may also result from external factors such as the economic situation of the country (Patrzalek, 2010; Satoła, 2015).

The existing disproportions of own income related to the geographic location of communes or to their administrative type may lead to different performance capabilities and so hinder implementation of the cohesion policy and consequently the harmonious local development (Kańduła, 2016). Transfer income provided within the framework of the state redistribution policy in the form of grants and subsidies plays an important role in reducing inequalities in the distribution of communes' income potential. Targeted grants allocated mainly for outsourced activities are a source of financing for new activities received by communes' local governments. The role of the general subsidy is, on the other hand, to counteract territorial disproportions in the distribution of income (Jastrzębska, 2012).

The aim of this paper was to diagnose changes in income inequality of the Wielkopolska province communes in 2005–2015 against the national backdrop, and by administrative type. The analysis placed greater emphasis on own income of the communes, but total income was also reviewed to assess the role of

redistribution in reducing income disparities. The study employed basic income inequality measures Gini and Theil indices, quintile share ratio, and the decile ratio. The Theil index was further decomposed between and within components of inequality by the administrative type of communes. The study drew on data from the Central Statistical Office (Local Data Bank).

## DATA AND METHODS

The study considered two main variables: own income per capita and total income per capita in 222 the communes<sup>1</sup> of the Wielkopolskie voivodeship in 2005–2015 obtained from the Local Data Bank/Public Finance database published by the Central Statistical Office.

Income inequalities in Poland and the Wielkopolska province communes was assessed using:

- The Gini index (Cowell, 2009; Panek, 2011): the most commonly used measure of income inequality ranging between 0 (ideally egalitarian distribution) and 1 (one commune has the entire income); the Gini index can be defined as half of the averaged absolute differences between all pairs of incomes, normalized on the mean income normalized on the mean income;
- The Theil index (Shorrocks, 1980): a frequently used measure of income inequality, which due to its property of additive decomposability, makes it possible to establish how much a particular type of communes contributes to the total inequality and what the level of inequality between those types is;
- The Quintile Share Ratio (S80/S20) (Laeken..., 2003): a popular Laeken indicator developed as part of the Lisbon Strategy and calculated as a ratio of total income received by 20% of all units (communes) with the highest income (the top quintile) to that received by the 20% with the lowest income;
- The Decile Ratio (D9/D1): the ratio of the ninth decile to the first decile (Radziukiewicz, 2006), that is the ratio of the lowest income of the 10% of communes with the highest income (the top decile) to highest income received by the 10% with the lowest income.

<sup>1</sup> The study did not include four communes that were cities with country rights (Poznań, Leszno, Kalisz and Konin) due to their different scope of competence and other sources of financing.

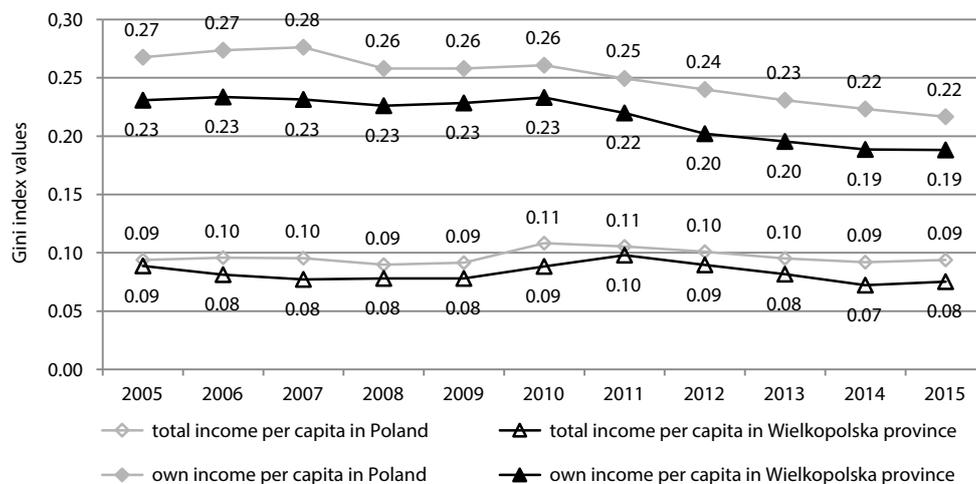
## RESULTS OF THE STUDY

Between 2005 and 2015, own income inequality in the Wielkopolska province declined (following the trend for the whole of Poland), but even towards the end of the period, it remained twice as high as total income inequality (Fig. 1). Throughout that time, own income inequality in the province showed values 0.03–0.04 lower than that in the entire country; the only exception being in 2007, when national own income inequality actually increased slightly from the previous level of 0.27 to 0.28, and the difference amounted to 0.05. The first half of the period saw a steady 0.23 value of own income inequality in the province, and somewhat a more variable 0.26–0.28 nationally, with a notable drop being recorded in 2008. That clear decrease coincided with the onset of an economic downturn and possibly resulted from its negative impact on communal finances, as exemplified by lower levels of financial self-sufficiency (Satoła, 2015). The communes first felt the impact in 2009 in the Wielkopolska province, when their income potential shrank sizably (Głowicka-Wołoszyn et al., 2018), but here the economic slowdown did not transform into a change of own income inequality (Fig. 1). A systematic and steady reduction of communes' own income inequality (both province and nationwide) began in 2011 and continued through to 2015, closing at 0.19 for the Wielkopolska province and 0.22 for the whole country.

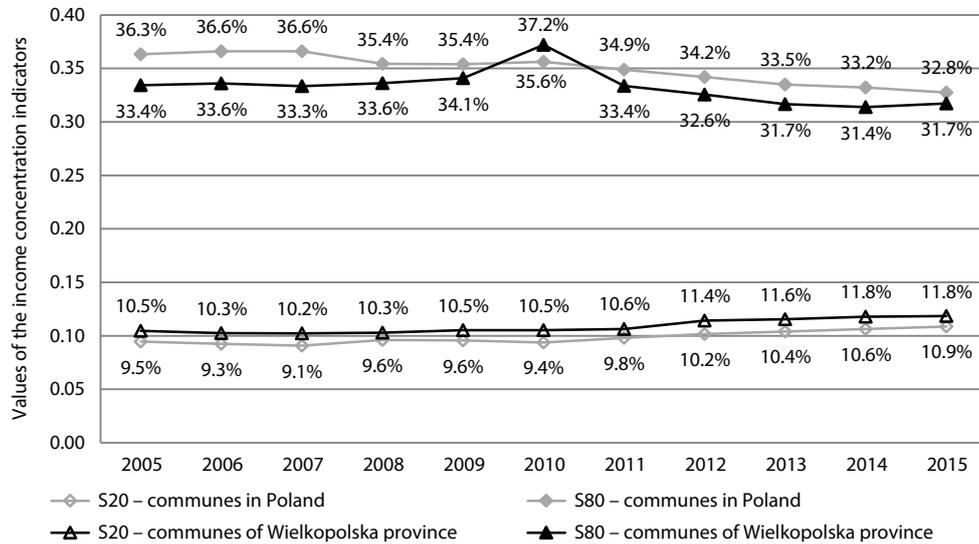
Unlike own income inequality, the total income inequality was at a low and stable level of approximately 0.1 throughout the period of study (both province and nationwide). Consistently though, the figures reported by the province communes were slightly lower than those for communes of the whole country, the gap alternately stretching to 0.02 or closing to almost nothing (Fig. 1).

A marked difference between the levels of own and total income inequality may, on the one hand, testify to a perfect implementation of redistributive policies that aim to achieve local convergence by mitigating the gross income disproportions between communes. On the other hand, it is not certain that hefty external income transfers with ensuing low total income inequality are conducive to an accelerated growth in lagging communes (Gorzela, 2010); nor is it obvious what levels of total income inequality signal a growing dependence of communes on central budget resources. A clear answer to these questions would require an in-depth study into the structure and volume of subsidies coupled with the dynamics of local development.

In order to better understand the changes shaping own income inequality and to identify processes that contributed to its decline, the D1, D5 (median), and D9 deciles of communes' own income distribution were calculated along with two popular inequality measures: the D9/D1 decile ratio (Table 1) and the S80/S20 quintile share ratio (Fig. 2). The analysis of these indicators



**Fig. 1.** Income inequality of communes of Wielkopolska province and Poland 2005–2015  
Source: own compilation based on Local Data Bank/Public Finance.



**Fig. 2.** Concentration indices of the own income distribution for the communes of Wielkopolska province and all Polish communes in 2005–2015  
Source: own elaboration based on Local Data Bank/Public Finance.

enabled resolving the question as to whether it was the sluggish dynamics of income potential of the richer or rather more energetic growth of the poorer communes that contributed to the decline of own income inequality.

Simply by comparing the median values of own income (D5), the typical communes of Wielkopolska province can be shown to have been more affluent than the standard Polish communes, throughout the period of study. In 2005, the gap was 12% (PLN 817 vs. PLN 730 in real 2015 values), but closed to only 6% in 2015 (Table 1).

The D1 figures in Table 1 indicate that the highest level of own income among the least 10% affluent communes in Wielkopolska province was PLN 519 in 2005, 18% higher than the 440 nationally. The gap remained positive for the entire period of study, but it decreased to just 11% in 2015. In the upper part of the distribution, the D9 decile of the lowest income level among the 10% most affluent Wielkopolska province communes was only 3% higher in 2005 than in the whole country. This gap then became negative (–5%) in 2007 and all but disappeared from 2010 onwards.

As a consequence, the first inequality index, i.e. the D9/D1 ratio, decreased slightly in the period of study both in the province (from 2.7 to 2.4) and in the country

as a whole (from 3.1 to 2.7). It remained consistently lower in the province than across the country, a fact that may very well be size dependent (Poland as a whole is much more varied than Wielkopolska, the latter being just one of its provinces).

Analyzing the average annual growth rate of D1 and D9, it was found that the own income level of the poorest communes increased faster than that of the most affluent, both in the voivodeship and the country. The respective figures were 6.2 and 6.9 for D1 and 4.7 and 5.1 for D9 (Table 1).

The values of the S80 concentration index of own income indicate that 20% of the most affluent Wielkopolska province communes (fifth quintile group) concentrated one third of the own income of all communes in that province in 2005, but the index dropped by 1.7 percentage points and amounted to 31.7% in 2015. At the same time, 20% of the poorest communes in Wielkopolska province (first quintile group) concentrated only 10.5% of total own income in 2005 (S20); the index increased by 1.3 percentage points to 11.8% in 2015. Over the period of study, similar but more pronounced changes in strength were observed for all communes in Poland, where the S80 index dropped by 3.5 percentage points from the level of 36.3% in 2005, and S20 rose by

**Table 1.** Real 2015 values of the D1, D5 (median), D9 deciles of own income per capita and D9/D5 ratio among communes of Wielkopolska province and the whole of Poland in 2005–2015

| Year                   | Wielkopolska province communes |        |       |       | Communes in Poland |        |       |       |
|------------------------|--------------------------------|--------|-------|-------|--------------------|--------|-------|-------|
|                        | D1                             | median | D9    | D9/D1 | D1                 | median | D9    | D9/D1 |
| 2005                   | 519                            | 817    | 1 424 | 2.7   | 440                | 730    | 1 381 | 3.1   |
| 2006                   | 535                            | 886    | 1 536 | 2.9   | 469                | 791    | 1 512 | 3.2   |
| 2007                   | 621                            | 993    | 1 640 | 2.6   | 526                | 894    | 1 721 | 3.3   |
| 2008                   | 673                            | 1 091  | 1 802 | 2.7   | 617                | 1 032  | 1 875 | 3.0   |
| 2009                   | 618                            | 1 033  | 1 746 | 2.8   | 572                | 963    | 1 784 | 3.1   |
| 2010                   | 658                            | 1 053  | 1 892 | 2.9   | 574                | 1 009  | 1 915 | 3.3   |
| 2011                   | 731                            | 1 180  | 1 964 | 2.7   | 613                | 1 061  | 1 938 | 3.2   |
| 2012                   | 759                            | 1 210  | 1 937 | 2.6   | 653                | 1 114  | 1 958 | 3.0   |
| 2013                   | 815                            | 1 249  | 1 965 | 2.4   | 713                | 1 186  | 2 005 | 2.8   |
| 2014                   | 909                            | 1 380  | 2 153 | 2.4   | 795                | 1 303  | 2 164 | 2.7   |
| 2015                   | 949                            | 1 468  | 2 246 | 2.4   | 855                | 1 384  | 2 267 | 2.7   |
| Annual growth rate (%) | 6.2                            | 6.0    | 4.7   | -1.5  | 6.9                | 6.6    | 5.1   | -1.7  |

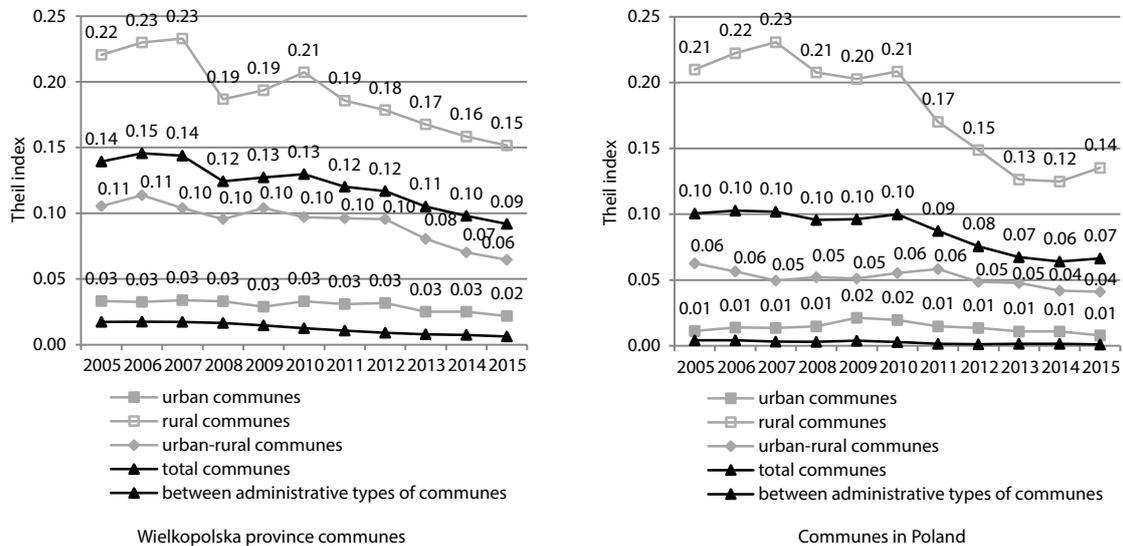
Source: own elaboration based on Local Data Bank/Public Finance.

1.4 percentage points from the initial 9.5%. This implies that while the inequality decline in Wielkopolska province was almost equally the result of the drop in the fifth and the rise in the first quintile group, the relative impoverishment of the most affluent for the whole country was more instrumental in bringing down the overall inequality level than the contribution of the income rise in the poorest communes. The observed inequality changes in the whole country are driven mostly by the upper part of the income distribution, while the communes of the province seem more equally affected in the lower and the upper part.

While the analysis of the lower and upper parts of own income distribution made it possible to determine whether the decrease in inequality was more attributable to the changes in the income concentration of the poorer or of the wealthier communes, the Theil decomposition helped to answer a similar question pertaining to the administrative types of communes. The Theil decomposition by administrative types in the Wielkopolska province and in Poland (Fig. 3) shows that the highest own income inequality was exhibited by rural communes

(Theil index between 0.12 and 0.23), while the lowest was by urban communes (between 0.01 and 0.03).

Rural communes constituted the largest percentage of all communes: out of a total of 2,478 Polish communes in 2015, 1,563 or 63% were rural (Powierzchnia..., 2016), whereas in Wielkopolska there were 115 rural communes, which comprised 51% of the total number of communes in the province. Rural communes undertake various function. Among them are communes with predominance of their original functions i.e. agricultural ones, but also there are communes where, in the analyzed period, dynamic demographic and social changes related to suburbanization took place (Stanisławska and Głowicka-Wołoszyn, 2017). These changes resulted in the transformation of the functionality profile of rural communes located in the vicinity of large cities. Research conducted by Stanisławska and Głowicka-Wołoszyn (2017) shows that rural communes situated in the Poznań Metropolitan Area lose their agricultural nature and now have rather residential and service functions. As a result of the different functions carried out by rural communes, their income potential can



**Fig. 3.** Theil indices and decomposition of own income inequality with respect to administrative types for the communes of Wielkopolska province and all Polish communes in 2005–2015  
Source: own elaboration based on Local Data Bank/Public Finance.

be highly unequal. Wołoszyn et al. (2016) demonstrate that own income inequalities between functional types of the Wielkopolska province communes in 2005–2009 were higher than inequalities within the distinguished types, a result that confirms the high degree of cohesion of the functional types. That relationship reversed in 2010–2015 when the communes started to exhibit more variability within and less between their functional types. The view of administrative types is quite different as they do not show such degree of cohesion as the functional types of communes.

Observing the changes in the Theil index for rural Wielkopolska province communes against all rural communes in Poland, a much smaller drop of own income inequality during the economic slowdown of 2008–2009 (to 0.21 in Wielkopolska and to 0.19 in Poland) can be noticed, but at the same time a far steeper plunge in the period 2010–2014 (from uniform 0.21 to 0.12 and 0.16, respectively). As for two other administrative types (urban-rural and urban), their own income inequality levels were smaller in Wielkopolska, roughly half of the same figures for Poland. Moreover, during the whole analyzed period, the between inequality component in Wielkopolska was only slightly above zero while nationally it reached 0.02 in 2005–2008, though then it decreased to below 0.01 in 2015.

## CONCLUSIONS

The study has led to the following conclusions:

1. In 2005–2015, communes of Wielkopolska province were characterized by lower own income inequality than all communes of Poland, which indicates a more even distribution of own income in the province. Calculated values of concentration indices further confirmed this finding. Comparing the concentration of own income in the first and in the fifth quintile groups (the groups of 20% of the least and the most affluent communes, respectively) between the communes of the province and those of the country, it was found that in the Wielkopolska province the least affluent communes concentrated more own income and the most affluent less than the respective groups in Poland as a whole.
2. In the period from 2005 to 2015, communes of both the province and country witnessed decreasing levels of own income inequality, with the dynamics of these changes being slightly lower in the province than in the country. The phenomenon of income equalization could be observed both in the growing concentration of own income among the poorest communes, and in the decreasing concentration among the wealthiest. This growth trend and

equalizing income potential that boosts the chances of meeting the needs of local communities can only be positively assessed. It must be remembered though, that given the considerable imbalance of demographic potential and the unequal level of socio-economic development, equalization of communes' income potential may not be enough to ensure similar standards of living for the inhabitants, especially of rural communes and those located peripherally.

3. Total income inequality during the period of study was much lower than own income inequality, which indicates a well-performed regulatory function of transfer income, but may well foreshadow a growing dependence of communes' income potential on state financial resources. In-depth studies should be carried out in order to assess the pro-growth effectiveness of the use of transfer income and to make the redistributive policy evaluation more explicit.
4. The Theil decomposition of total inequality by administrative types of communes allowed to observe that the between component of inequality was negligible and that rural communes possessed the highest level of own income inequality, a fact that can be explained by the heterogeneity of their functional profiles.

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## NIERÓWNOŚCI DOCHODOWE GMIN WOJEWÓDZTWA WIELKOPOLSKIEGO W LATACH 2005–2015

**Abstrakt.** Celem przeprowadzonych badań była diagnoza poziomu nierówności dochodowych gmin w województwie wielkopolskim w latach 2005–2015 z uwzględnieniem ich typów administracyjnych. Analizowano poziom dochodów własnych oraz dochodów ogółem *per capita* w gminach województwa wielkopolskiego na tle ogółu gmin w Polsce. W badaniu wykorzystano współczynniki nierówności dochodowych Giniego, Theila oraz wskaźniki zróżnicowania kwintylowego i decylowego. Za pomocą współczynnika Theila dokonano dekompozycji nierówności dochodowych ogółu gmin w województwie wielkopolskim względem ich typów administracyjnych. Podstawę informacyjną badań stanowiły dane pochodzące z baz danych publikowanych przez Główny Urząd Statystyczny [Bank Danych Lokalnych/Finanse publiczne].

**Słowa kluczowe:** nierówności dochodowe, wskaźnik Giniego, współczynnik Theila, współczynnik zróżnicowania kwintylowego, gminy