

Statistical Measures of Affluence: Macroregions in Poland

Wolny-Dominiak, Alicja; Sączewska-Piotrowska, Anna

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Wolny-Dominiak, A., & Sączewska-Piotrowska, A. (2022). Statistical Measures of Affluence: Macroregions in Poland. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie / Cracow review of economics and management*, 1 (995), 27-41. <https://doi.org/10.15678/ZNUEK.2022.0995.0102>

Nutzungsbedingungen:

Dieser Text wird unter einer CC BY-NC-ND Lizenz (Namensnennung-Nicht-kommerziell-Keine Bearbeitung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:

<https://creativecommons.org/licenses/by-nc-nd/4.0/deed.de>

Terms of use:

This document is made available under a CC BY-NC-ND Licence (Attribution-Non Commercial-NoDerivatives). For more information see:

<https://creativecommons.org/licenses/by-nc-nd/4.0>

Zesz. Nauk. UEK, 2022, 1(995): 27–41
ISSN 1898-6447
e-ISSN 2545-3238
<https://doi.org/10.15678/ZNUEK.2022.0995.0102>

Statistical Measures of Affluence: Macroregions in Poland

Statystyczne miary zamożności – makroregiony
w Polsce

Alicja Wolny-Dominiak¹, Anna Sączewska-Piotrowska²

¹ University of Economics in Katowice, Department of Statistical and Mathematical Methods in Economics,
1 maja 50, 40-287 Katowice, e-mail: alicia.wolny-dominiak@uekat.pl,
<https://orcid.org/0000-0002-7484-5538>

² University of Economics in Katowice, Department of Labour Market Forecasting and Analysis,
1 maja 50, 40-287 Katowice, e-mail: anna.saczewska-piotrowska@ue.katowice.pl,
<https://orcid.org/0000-0001-9760-3649>

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 License (CC BY-NC-ND 4.0); <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Suggested citation: Wolny-Dominiak, A., Sączewska-Piotrowska, A. (2022) "Statistical Measures of Affluence: Macroregions in Poland", *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie* 1(995): 27–41, <https://doi.org/10.15678/ZNUEK.2022.0995.0102>.

ABSTRACT

Objective: The paper presents an analysis of the affluence in macroregions of Poland based on statistical measures of income distribution.

Research Design & Methods: The analysis uses a group of measures based on the distribution of income in the population studied. The measures characterise a given population in terms of the extent and/or intensity of its affluence. Income inequality and income polarisation are also analysed. All computations are based on European Union Statistics on Income and Living Conditions (EU-SILC) from 2018.

Findings: Income affluence is very differentiated across Poland's macroregions. The Mazowieckie voivodeship macroregion has the highest share of the affluent. All of the other affluence measures likewise show this region to be the most affluent.

Implications/Recommendations: Basic measures of income inequality and polarisation give a good initial picture of income affluence but obtaining detailed information about this

phenomenon is possible thanks to specific measures of the extent and intensity of income affluence. The results show that affluence is highly differentiated in Poland. Poland's government would be well-advised to take appropriate measures to encourage entrepreneurs to invest capital in less affluent macroregions.

Contribution: The research conducted in this paper shows how to analyse the affluence in subpopulations taking into account the distribution of income. Analysis of income affluence fills the gap in income analyses focusing most of all on poverty. All the statistical measures used provide knowledge about how the affluent greatly influence the economy, policy, and other aspects of life.

Article type: original article.

Keywords: income, affluence measures, income polarisation, affluenceIndex package, macroregions in Poland.

JEL Classification: D31, D63, I31.

STRESZCZENIE

Cel: W artykule przeanalizowano zamożność dochodową w Polsce w podziale na makroregiony, wykorzystując wskaźniki statystyczne oparte na rozkładzie dochodów.

Metodyka badań: W analizie wykorzystano grupę miar opartych na rozkładzie dochodów w badanej populacji. Miary te charakteryzują daną populację pod względem zasięgu i (lub) intensywności zamożności. Analizowane są również nierówności dochodowe i polaryzacja dochodowa. Wszystkie obliczenia opierają się na europejskim badaniu warunków życia ludności (EU-SILC) z 2018 r.

Wyniki badań: Zamożność dochodowa w makroregionach Polski jest bardzo zróżnicowana. Największym udziałem zamożnych charakteryzuje się makroregion województwo mazowieckie. Również inne mierniki zamożności pokazują, że region ten jest zdecydowanie najbogatszy.

Wnioski: Podstawowe miary nierówności i polaryzacji dochodów pozwalają uzyskać wstępny obraz zamożności dochodowej, ale otrzymanie szczegółowych informacji o tym zjawisku jest możliwe dzięki określonym miarom zasięgu i intensywności zamożności dochodowej. Na podstawie uzyskanych wyników można stwierdzić, że zamożność jest w Polsce zjawiskiem bardzo zróżnicowanym, co powinno skłonić rząd do podjęcia odpowiednich działań zachęcających przedsiębiorców do inwestowania kapitału w mniej zamożnych makroregionach.

Wkład w rozwój dyscypliny: Przedstawione w artykule badania pokazują, jak analizować zamożność dochodową, wykorzystując miary statystyczne oparte na rozkładzie dochodów gospodarstw domowych. Wypełniają one lukę w analizach dochodowych skupiających się przede wszystkim na ubóstwie oraz dają możliwość zdobycia wiedzy na temat zamożności dochodowej, a także osób zamożnych mających istotny wpływ na gospodarkę, politykę i inne aspekty życia.

Typ artykułu: oryginalny artykuł naukowy.

Słowa kluczowe: dochód, miary zamożności, polaryzacja dochodu, pakiet affluenceIndex, makroregiony w Polsce.

1. Introduction

Reducing poverty and social exclusion is a crucial goal for all countries. Increasing knowledge about how to do so is therefore important for researchers, governments, and social workers as well. Every society has poor and affluent individuals. There is an open discussion of whether affluence and richness should be studied at all, since the wealthy and more well-off are not a problem in terms of social policy. It can be stated that the economic elite, the upper classes in the society are not a problem but rather drive entire regions and countries. From the psychological point of view, they are a model to follow; from the pragmatic and economic point of view – they shape whole societies, giving jobs to others. In terms of nomenclature, a strict distinction between the terms “affluence” and “richness” does not exist. According to Radziukiewicz, richness is the highest level of affluence (Radziukiewicz 2006). The “highest level” is of course not a strict line; and thus in practice, different authors use different cut-offs. This can lead to the same individual being considered either rich or affluent. In this paper, the cut-off was set at relatively low level, and therefore affluence is studied rather than richness.

In income affluence analysis, the first problem is to define who is affluent and who is rich. This question can be answered in multiple ways. First, though, it must be decided how affluence and richness are to be considered – through the prism of income (Brzeziński 2010), wealth (Research Institute 2020), or money spent on luxury goods and services (KPMG 2019). A more comprehensive approach – multidimensional – has been employed by Törmälehto (Törmälehto 2017). Other authors propose that affluence and richness be viewed with reference to poverty. For example, Danziger, Gottschalk and Smolensky (1989) defined personal richness as one with an income that exceeds the poverty line by at least nine times. The present study is focused on affluence considered through the prism of income in which the income random variable is taken into consideration.

The second problem is to define the cut-off for distinguishing who is affluent or rich, and who is not. This can be done in two ways: with the cut-offs as either absolute or relative, and the lines defined in either absolute or relative terms. In short, affluence can be defined as having more than an objectively defined amount of money (the absolute approach) or having more than others in society (the relative approach). In both the absolute and relative approach, affluence is an objective situation (experts define the critical threshold of affluence). There is also a third way of defining affluence – as a subjective situation (individual assessment of material status). This approach is not analysed in this paper.

Authors who have opted to study affluence in terms of absolute (richness) lines include Di Maggio, Romanowski and Walter (2003), Hutton (2006), Bose, Chakravarty and D'Ambrosio (2014). Authors who have focused on relative thresh-

olds of affluence (richness) include Peichl, Schaefer and Scheicher (2010), Franzini, Granaglia and Raitano (2016). Medeiros (2006) proposed their own affluence line, setting the minimum income above which the income of the rich can be reduced in order to carry out income transfers to the poor in such a way as to eliminate poverty.

Some empirical studies of affluence (richness) choose the lines based on the absolute amount of income per person or household. For example, according to Hutton (2006), the richest group of people includes those whose annual disposable income exceeds \$20 million. According to Bose, Chakravarty and D'Ambrosio (2014), monthly net income in rich households comes in higher than EUR 4.5 thousand.

Numerous studies have been done on the income share of the top of the population, and researchers have been analysing very differentiated top income shares. Examining the richness in Anglo-Saxon and selected non-English countries, Leigh (2009) takes the share of income of 10% and 1% of the richest individuals. Piketty and Saez (2003) conduct a fairly extensive analysis of the richest groups in the United States, assuming the levels of 10%, 5%, 1%, 0.5%, 0.01%, and 0.001%. High affluence lines were used by Feenberg and Poterba (2000) in their 1960–1995 American household income surveys, which characterised as rich the top 0.5% of units in the income distribution. In analysing wages in France, Godechot (2012) focuses on 0.1% and 0.01% of the richest individuals, describing them as the wage elite. Bach, Corneo and Steiner (2009), analysing income distribution in Germany in 1992–2003, define 0.001% of the richest people as the economic elite.

Finally, it is assumed in the analyses that the lines set as the median income multiples. Affluence (richness) lines are commonly set by multiplying the median by two, three, or four. Multiplying the median by three to compute the affluence line, by five for the richness line, and even by ten to distinguish the super-rich from others. Relative thresholds of affluence and richness were used by Grabka and Frick (2008), Brzeziński (2010), Peichl, Schaefer and Scheicher (2010), Franzini, Granaglia and Raitano (2016), Törmälehto (2017), Sączewska-Piotrowska (2018).

There is no single best solution to the question of which line should be chosen. It is up to the researcher. The *affluenceIndex* package presented in this paper makes it possible, among other things, to calculate the affluence measures based on different multiples of the median income and to calculate the share of income held by the richest. It is assumed that the affluence line is determined in relative terms.

The next issue to address before studying affluence or richness is choosing the unit of measure to be used (to decide whether persons, families, or households are to be studied), the equivalent scale, and a measure of central tendency. A convenient aspect of affluence or richness studies is that all those issues mentioned before can be solved using the same choices one makes in studies on poverty. This makes the

literature on poverty, including Atkinson *et al.* (2002), Haughton and Khandker (2009), very useful.

The paper is organised as follows. Section 2 presents the most popular affluence measures together with the Wolfson polarisation index and the Gini coefficient. The analysis of Polish survey data is introduced in Section 3. The measures are computed for the whole sample as well as the subpopulation according to the area criteria – the macroregions of Poland (see Fig. 4). All calculations are done with the dedicated R-based package *affluenceIndex* (Wolny-Dominiak & Sączewska-Piotrowska 2021). The discussion of the results and main conclusions are presented in Section 4.

2. The Affluence, Inequality, and Polarisation Measures

Let us assume the sample of incomes of households x_1, \dots, x_n taken from the population and the vector of weights w_1, \dots, w_n . The first measure corresponds to the income share of the top $p\%$ of the population and is defined as (Brzeziński 2010):

$$R^{IS}(\mathbf{x}, \mathbf{w}, p) = \frac{\sum_{i=1}^n x_i w_i \mathbf{1}_{x_i > q_{w(1-p)}}}{\sum_{i=1}^n x_i w_i}, \tag{1}$$

where $q_{w(1-p)}$ is the $(1-p)$ weighted quantile of the population and $\mathbf{1}$ denotes the indicator function, which is equal to 1 when the condition is true and 0 otherwise. For the indicators based on the shares of income of the highest $p\%$ of individuals, it is assumed that there is always $p\%$ of affluent individuals in the population.

The next measure needs first the estimation of the affluence line ρ_w defined as the multiple of the weighted median income. The measure called affluence headcount ratio can then be computed as (Brzeziński 2010, Sączewska-Piotrowska 2015):

$$R^{HC}(\mathbf{x}, \mathbf{w}, \rho_w) = \frac{\sum_{i=1}^n \mathbf{1}_{x_i > \rho_w} w_i}{\sum_{i=1}^n w_i}. \tag{2}$$

This ratio represents the proportion of the population with incomes above the affluence line.

The last two measures take into account both the extent and the intensity of affluence. The exact formulas are defined as follows:

$$R_{\beta}^{Cha}(\mathbf{x}, \mathbf{w}, \rho_w) = \frac{\sum_{i=1}^n \left(1 - \left(\frac{\rho_w}{x_i}\right)^{\beta}\right) \mathbf{1}_{x_i > \rho_w} w_i}{\sum_{i=1}^n w_i}, \quad \beta > 0, \tag{3}$$

$$R_{\alpha}^{FGT, T2}(\mathbf{x}, \mathbf{w}, \rho_w) = \frac{\sum_{i=1}^n \left(\frac{x_i - \rho_w}{\rho_w}\right)^{\alpha} \mathbf{1}_{x_i > \rho_w} w_i}{\sum_{i=1}^n w_i}, \quad \alpha > 1, \tag{4}$$

where α and β are the parameters. The measures R_β^{Cha} and $R_\alpha^{FGT, T2}$ were proposed by Peichl, Schaefer and Scheicher (2010) and are analogous to the poverty measures introduced by Chakravarty (1983) and Foster, Greer and Thorbecke (1984), respectively. R_β^{Cha} is more sensitive to the income of the rich close to the affluence line, in particular with higher values of parameter β . $R_\alpha^{FGT, T2}$ is more sensitive to the thickness of the tail, particularly with higher values of parameter α . The concave measure of affluence R_β^{Cha} is more robust to extreme values of income than the convex measure $R_\alpha^{FGT, T2}$.

R_β^{Cha} and $R_\alpha^{FGT, T2}$ are mainly used in comparisons of affluence. Both measures satisfy all desirable axioms formulated in the axiom literature on poverty, including the subgroup decomposability axiom, which means that the overall degree of affluence may be decomposed into the weighted sum of subgroup richness indices. R_β^{Cha} satisfies the transfer axiom in the concave version (the index increases when a rank-preserving progressive transfer between two rich people takes place, i.e. when a billionaire gives money to a millionaire) and the index defined by formula 4 satisfies this axiom in the convex version (the index decreases when a rank-preserving progressive transfer between two rich people occurs) (Törmälehto 2017). The choice between convex and concave measures is subjective and is impossible without moral judgment whether households should be more or less affluent. While these two measures are mainly used in comparisons of affluence, their interpretations are not so practical in headcount and income share ratios of the top $p\%$. Finally, for most people, the choice of parameters α and β is not easy to communicate.

Affluence is inextricably linked with income distribution. Knowledge about income inequality and polarisation constitutes additional information about affluence, while the considerations on income inequality and polarisation allow for a preliminary assessment of the scale of affluence. On the one hand, more polarised income distribution translates into a relatively smaller middle-income class and more low- and/or high-income individuals (Alichi, Kantenga & Solé 2016). The low-income class is very often identified with poverty and the high-income class with affluence (or richness). On the other hand, increasing income inequality means that there are poor and affluent individuals in society.

One of the measures of polarisation is the Wolfson polarisation index (Wolfson 1994). It depends on the weighted Gini coefficient, which is written (Sen 1997):

$$G = \frac{\sum_{i=1}^n w_i \sum_{j=1}^n w_j |x_i - x_j|}{2(\sum_{i=1}^n w_i)^2 \mu_w}, \quad (5)$$

where x_i is an income of individual i , n is the number of individuals, and μ_w is the weighted mean income. The Gini coefficient is one of the most popular inequality measures in the world. The coefficient ranges between 0 (perfect equality) and 1

(perfect inequality). This coefficient is often expressed as a percentage. It shows the relationship of cumulative shares of the population arranged according to the level of income, to the cumulative share of the total income received by them. The Gini coefficient can be interpreted as half of the relative mean absolute weighted difference.

The Wolfson polarisation index then takes the form:

$$P = 2(2T - G) \frac{\mu_w}{q_w}, \quad (6)$$

where q_w is the weighted median income and T is the difference between 0.5 and the income share of the bottom half of the population. This index lies between 0 and 1 and the high values of the index entail great polarisation. The Wolfson index is commonly expressed as a percentage.

3. The Affluence Measures for Polish Income Data

In the analysis, the Polish equivalised income data set of about 15,214 households was used. The analysis of income affluence of macroregions in Poland (NUTS1) was done using data from European Union Statistics on Income and Living Conditions (EU-SILC) from 2018. Income was adjusted according to the modified OECD (Organisation for Economic Co-operation and Development) equivalence scale, which assigns a weight to all members of the household (Eurostat 2018): 1 to the first adult, 0.5 to each subsequent person aged 14 and older, and 0.3 to each person under 14.

The calculations included information about household cross-sectional weight and information about household size. Finally, the weight of the household is obtained by multiplying sampling weight and household size.

In the first step income inequality, polarisation, and affluence measures are calculated for all persons living in households (Figure 1 and Table 1). In the analysis, the following assumptions were made: the affluence line is set at 200% (R_{2Me}^{HC}) of the median; the share of the top 10% households was considered; and parameters α and β were set at the 2 ($R_2^{FGT, T2}$ and R_2^{Cha} , respectively).

The histogram shows strong skewness with a long heavy tail as the small number of persons in households generates a very high level of income. The Lorenz curve illustrates that income inequality is not high, a fact confirmed by the low Gini coefficient value. The Gini coefficient equals 27.84%, meaning that the average absolute difference in incomes between any two randomly selected persons living in households is 55.68% of the mean income. The quite low value of the Wolfson polarisation index does not indicate that the middle class disappears. The share of households living over the affluence line defined as two times median is 7.51%. The share of the total income received by the top 10% of households is 22.13%.

Single values of R_2^{Cha} and $R_2^{FGT, T2}$ is hard to interpret. To assess the changes in affluence, more values from other years for Poland would be needed.

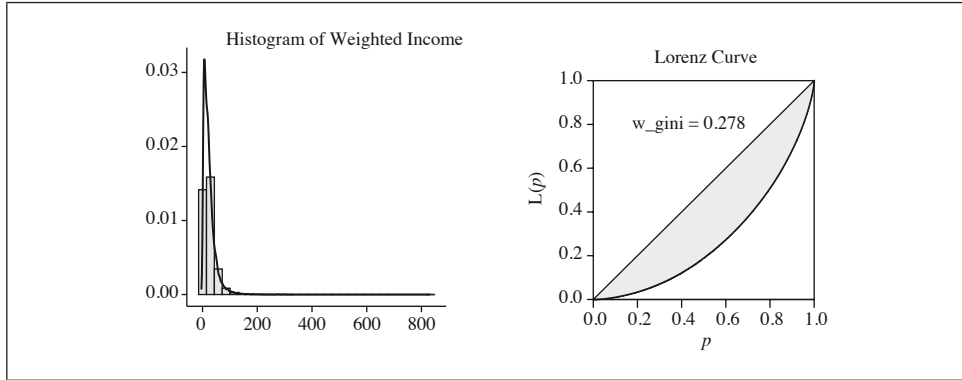


Fig. 1. Histogram of Weighted Income and Lorenz Curve with Gini Coefficient in Poland, 2018
Source: the authors, based on EU-SILC.

Table 1. Income Inequality, Polarisation, and Affluence Measures in Poland, 2018 (in %)

G	P	R_{2Me}^{HC}	R^{IS}	R_2^{Cha}	$R_2^{FGT, T2}$
27.84	22.48	7.51	22.13	2.57	1.92

Source: own study based on EU-SILC.

Figures 2 and 3 present the histogram and the Lorenz curves for Poland's macroregions, while Table 2 shows the values of affluence, inequality, and polarisation measures for the same macroregions.

In all macroregions the income distributions are right-skewed. From among all of the regions, median income is the lowest in the central region, which is also characterised by the lowest value of the Wolfson measure and by a low Gini coefficient value. Only in the north-western microregion had a Gini coefficient lower than the central macroregion's. At the other end of the spectrum, the Mazowieckie voivodeship macroregion is characterised by the highest values of polarisation and inequality measures, suggesting that it is home to the country's most affluent. Indeed, all of the affluence measures calculated came in highest for the Mazowieckie macroregion. This means that both the extent and intensity of income affluence are the greatest. For example, every third person lives in the 10% most affluent households ($R_{10}^{IS} = 34.56\%$) and every eighth person lives in households with income higher than 200% of the median income ($R_{2Me}^{HC} = 13.47\%$). In the case of the eastern macroregion, these values are 15.08% and 4.86%, respectively.

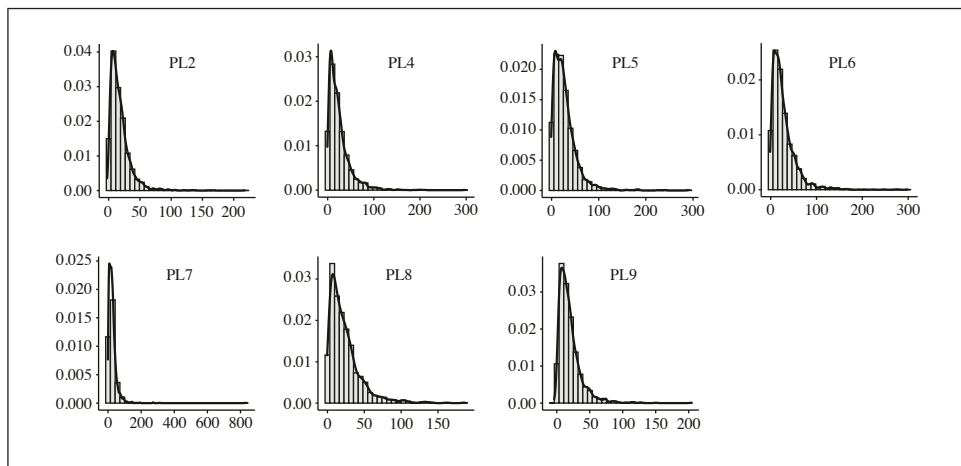


Fig. 2. Histogram of Weighted Income in Macroregions in Poland, 2018
 Macroregions: PL2 – the south macroregion, PL4 – north-western, PL5 – south-western, PL6 – northern, PL7 – central, PL8 – eastern, PL9 – Mazowieckie voivodeship.
 Source: the authors, based on EU-SILC.

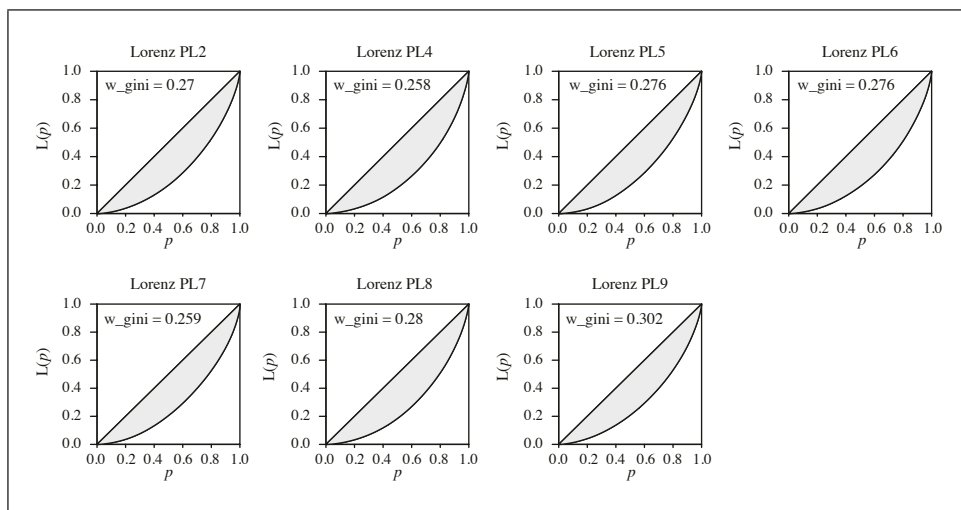


Fig. 3. Histogram of Weighted Income and Lorenz Curve with Gini Coefficient, Macroregions in Poland, 2018
 Macroregions: PL2 – the south macroregion, PL4 – north-western, PL5 – south-western, PL6 – northern, PL7 – central, PL8 – eastern, PL9 – Mazowieckie voivodeship.
 Source: the authors, based on EU-SILC.

Table 2. Income Inequality, Polarisation, and Affluence Measures in Poland's Macroregions, 2018 (in %)

Macroregion	G	P	R_{2Me}^{HC}	R_{10}^{IS}	R_2^{Cha}	$R_2^{FGT, T2}$
South	27.0	21.6	7.73	21.71	2.54	1.56
North-western	25.8	21.0	6.20	18.38	1.98	1.48
South-western	27.6	22.9	8.63	24.76	2.91	1.56
Northern	27.6	22.4	6.55	20.69	2.23	1.40
Central	25.9	20.1	4.84	16.42	1.78	1.64
Eastern	28.0	23.4	4.86	15.08	1.31	0.44
The Mazowieckie voivodeship	30.2	26.6	13.47	34.56	5.22	5.43

Source: the authors, based on EU-SILC.

Figure 4 presents the spatial differentiation of Poland's income affluence.

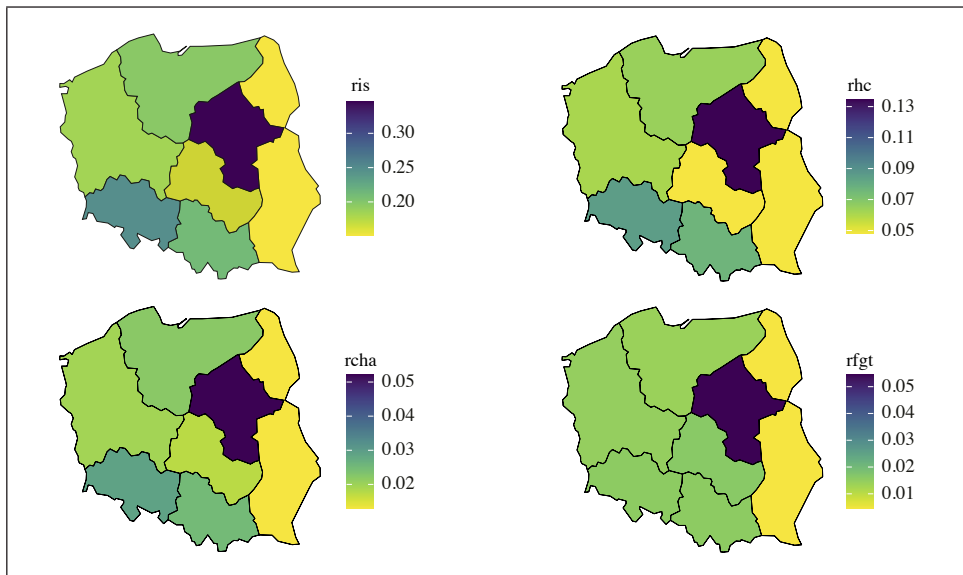


Fig. 4. Spatial Differentiation of the Affluence Measures in Poland, 2018

Source: the authors, based on EU-SILC.

Visualising the values of the affluence measures on the map illustrates Mazowieckie's status as "a lonely island" surrounded by less affluent macroregions. It borders to the east the macroregion characterised by the lowest extent and intensity of the affluence (the eastern macroregion). The west of Poland is more affluent than the east, with the south-western macroregion more affluent than the

macroregions it abuts. Nonetheless, it remains less affluent than the Mazowieckie voivodeship macroregion.

Figure 5 provides the radar plot presenting how affluence compares across the macroregions. All of the measures are scaled to the range [0,1] according to the min/max rule.

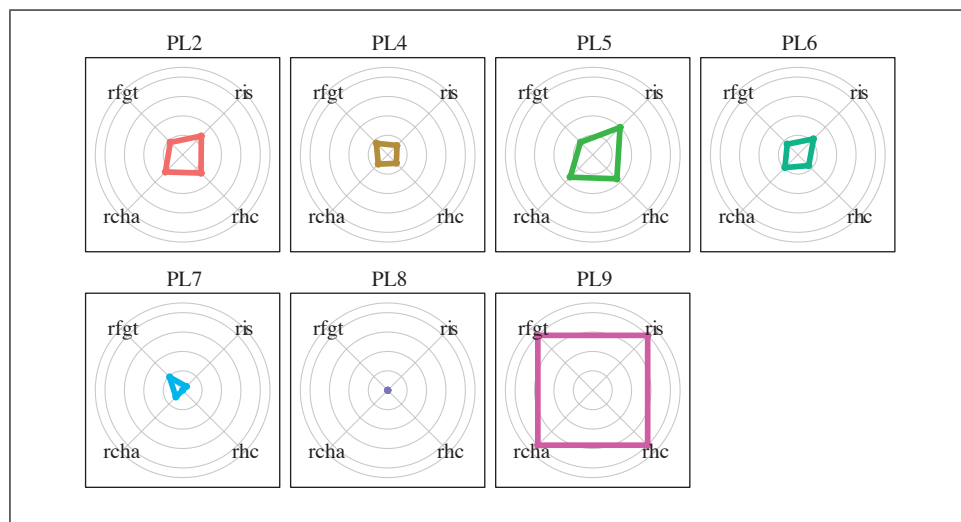


Fig. 5. Radar Chart of Income Affluence in Poland's Macroregions, 2018

Macroregions: PL2 – the south macroregion, PL4 – north-western, PL5 – south-western, PL6 – northern, PL7 – central, PL8 – eastern, PL9 – Mazowieckie voivodeship.

Source: the authors, based on EU-SILC.

The Mazowieckie voivodeship macroregion is clearly characterised by the highest level of income affluence, while the south-western macroregion also fares relatively favourably. The eastern macroregion comes in at the low end of the affluence ranking. Ultimately, however, it is the Mazowieckie voivodeship microregion that stands out among all Poland's macroregions, achieving a much higher level of affluence than the rest.

4. Discussion and Conclusions

Analyses of affluence and richness, neither of which pose a problem in social policy, are not as popular as those of poverty. The importance of the affluent and rich in the economy is indisputable, and therefore the tools and techniques allowing one to conduct analyses of these groups should be developed.

Comparison of the results with those of previous research is impossible as we use different affluence lines. Additionally, the results concern different years and

territorial units. The closest research was conducted by Törmälehto (2017). He used the EU-SILC database, the same approach to weighting, and two times median income as the affluence line. He found that the affluence headcount ratio was 9.7% in 2015. This means that the percentage of the affluent increased in 2018 by almost 2.2 percentage points. A study on the affluence by macroregions has not yet been conducted, so the results of this research are incomparable with other results.

The full analysis of income distribution should include information about affluence. Other R packages such as *convey* (Pessoa, Damico & Jacob 2021), *ineq* (Zeileis 2014), *laeken* (Alfons & Templ 2013), and *rtip* (Berihuete, Ramos & Sordo 2018) focus on the analysis of income inequality and/or income poverty. The package used here, *affluenceIndex*, enables us to complete the analysis of income distribution. It is important to analyse overall income distribution because a large extent of poverty is not equivalent to a small extent of affluence. There may also be a large middle class.

As concerns Poland's macroregions, the central region's results are particularly interesting. According to the results of EU-SILC (GUS 2019), the extent of the poverty (with the poverty line set at 60% of the median income) in this region is 15.4%. That is similar to the overall national result, but the extent of the affluence in the central region is the lowest in the whole country (4.84%). This means that the middle class (income between 60% and 200% of the median income) is, at nearly 80%, very enormous. By contrast, the Mazowieckie voivodeship microregion has poverty and affluence levels at 11.7% and 13.47%, respectively. The middle class in this macroregion is therefore significantly smaller (about 75%) than the central macroregion's.

The analysis of income affluence by macroregions in Poland in 2018 should be extended to studying affluence changes over time. It will be particularly interesting to compare the results from 2018 with the results from 2020 (the beginning of the COVID-19 pandemic). The pandemic has had an enormous impact on all aspects of life. From the beginning of the pandemic, the labour market has seen major vicissitudes including huge losses and countless bankruptcies. Additionally, in 2021 prices in Poland jumped substantially (the highest inflation since 2001) but are only a prelude to the further increases and inflation expected in due to rising gas and electricity prices. The next government programme – the COVID-19 recovery plan called the “Polish Deal” intended for implementation from 2022 – is likely to change the income situation because the plan significantly influences tax policy. The study of poverty and affluence will be crucial to follow the changes in income distribution and allow the government to design further measures to help certain groups of people and parts of Poland. For example, the government should undertake to encourage entrepreneurs to invest capital in less affluent parts of Poland and thus to equalise the chances of people there to get ahead.

The “Polish Deal” is not the only programme changing the country’s income situation. In recent years, changes in income distribution have been caused by major government programmes including the “500+ Family” programme that has been implemented since 2016 (Kucharska 2020) or the “Solidarity Levy” since 2019 (Lewkowicz-Grzegorzczak 2021, Serwacki 2020). However, neither of these programmes were as far-reaching as the COVID-19 pandemic or the “Polish Deal”.

The main problem those seeking to institute measures changing income distribution face is how to do it fairly. All solutions in fiscal and social policy are related to transferring funds from more to less affluent groups of people. In deciding if and how to go about it, the government should take into account the interests of the affluent and the rich. Unfortunately, a deeper dive into these issues is beyond the scope of this paper.

This analysis of affluence has a number of limitations. The main problem is that such an analysis uses a one-dimensional approach. Affluence analysed only through the prism of income provides only a piece of the affluence picture while ignoring other aspects (e.g. expenditures, wealth, non-financial aspects). The second limitation concerns the relative approach to affluence, which should be used more in developed countries, where an approach “to having more than others” tends to be more accepted than in poor countries, where the most important problem is “to have more than the minimum”.

Finally, a one-dimensional approach in poverty analyses based on income data is popular in empirical studies because of the relatively easy availability of the data. Therefore, this approach is used by well-known institutions (e.g. Eurostat). The *affluenceIndex* package presented herein helps to widen income distribution analyses and to focus on the inverse of poverty – that is, affluence.

References

- Alfons A., Templ M. (2013), *Estimation of Social Exclusion Indicators from Complex Surveys: The R Package Laeken*, “Journal of Statistical Software”, vol. 54(15), <https://doi.org/10.18637/jss.v054.i15>.
- Alichi A., Kantenga K., Solé J. (2016), *Income Polarization in the United States*, IMF Working Paper no. WP/16/121, Washington, DC, <https://doi.org/10.2139/ssrn.2882555>.
- Atkinson T., Cantillon B., Marlier E., Nolan B. (2002), *Social Indicators: The EU and Social Inclusion*, Oxford University Press, New York.
- Bach S., Corneo G., Steiner V. (2009), *From Bottom to Top: The Entire Income Distribution in Germany, 1992–2003*, “Review of Income and Wealth”, vol. 55(2), <https://doi.org/10.1111/j.1475-4991.2009.00317.x>.
- Berihuete A., Ramos C. D., Sordo M. A. (2018), *rtip: Inequality, Welfare and Poverty Indices and Curves Using the EU-SILC Data, R package version 1.1.1*, <https://CRAN.R-project.org/package=rtip> (accessed: 10.02.2022).

- Bose A., Chakravarty S. R., D'Ambrosio C. (2014), *Richness Orderings*, "The Journal of Economic Inequality", vol. 12(1), <https://doi.org/10.1007/s10888-013-9249-4>.
- Brzeziński M. (2010), *Income Affluence in Poland*, "Social Indicators Research", vol. 99(2), <https://doi.org/10.1007/s11205-010-9580-0>.
- Chakravarty S. R. (1983), *A New Index of Poverty*, "Mathematical Social Sciences", vol. 6(3), [https://doi.org/10.1016/0165-4896\(83\)90064-1](https://doi.org/10.1016/0165-4896(83)90064-1).
- Danziger S., Gottschalk P., Smolensky E. (1989), *How the Rich Have Fared, 1973–1987*, "American Economic Review", vol. 79(2).
- Di Maggio F., Romanowski P., Walter C. (2003), *Eastern European Banking Matures*, "The McKinsey Quarterly", no. 2.
- Eurostat (2018), *Glossary: Equivalised Disposable Income*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Equivalised_disposable_income (accessed: 7.11.2020).
- Feenberg D. R., Poterba J. M. (2000), *The Income and Tax Share of Very High-income Households, 1960–1995*, "American Economic Review", vol. 90(2), <https://doi.org/10.1257/aer.90.2.264>.
- Foster J., Greer J., Thorbecke E. (1984), *A Class of Decomposable Poverty Measures*, "Econometrica", vol. 52(3), <https://doi.org/10.2307/1913475>.
- Franzini M., Granaglia E., Raitano M. (2016), *Extreme Inequalities in Contemporary Capitalism. Should We Be Concerned about the Rich?*, Springer, Switzerland.
- Godechot O. (2012), *Is Finance Responsible for the Rise in Wage Inequality in France?*, "Socio-Economic Review", vol. 10(3), <https://doi.org/10.1093/ser/mws003>.
- Grabka M., Frick J. (2008), *The Shrinking German Middle Class – Signs of Long-term Polarization in Disposable Income?*, "DIW Berlin Weekly Report", vol. 4(4).
- GUS (2019), *Dochody i warunki życia ludności Polski – raport z badania EU-SILC 2018* [Incomes and Living Conditions of the Population of Poland – Report from the EU-SILC Survey of 2018], GUS, Warszawa.
- Haughton J., Khandker S. R. (2009), *Handbook on Poverty and Inequality*, The World Bank, Washington.
- Hutton R. (2006), *Rich Spurn Ultra Luxury Cars*, "The Sunday Times", November 5.
- KPMG (2019), *Rynek dóbr luksusowych w Polsce. Luksus przez pokolenia* [The Luxury Goods Market in Poland. Luxury for Generations], KPMG, <https://assets.kpmg/content/dam/kpmg/pl/pdf/2019/12/pl-raport-kpmg-w-polsce-pt-rynek-dobr-luksusowych-w-polsce-2019.pdf> (accessed: 28.11.2020).
- Kucharska P. (2020), *Ocena skuteczności programu „Rodzina 500+” w zakresie ograniczenia ubóstwa i zwiększenia dzietności w Polsce* [The Effectiveness of Poland's "Family 500+" Programme in Terms of Reducing Poverty and Increasing the Fertility Rate], "Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie", vol. 5(989), <https://doi.org/10.15678/ZNUEK.2020.0989.0505>.
- Leigh A. (2009), *Top Incomes* (in:) *Handbook of Economic Inequality*, W. Salverda, B. Nolan, T. Smeeding (eds), Oxford University Press, Oxford.

- Lewkowicz-Grzegorzczak K. A. (2021), *The Concept of Fairness as a Criterion for the Assessment of the Personal Income Tax in Poland*, "Optimum. Economic Studies", vol. 106(4), <https://doi.org/10.15290/oes.2021.04.106.07>.
- Medeiros M. (2006), *The Rich and the Poor: The Construction of an Affluence Line from the Poverty Line*, "Social Indicators Research", vol. 78(1), <https://doi.org/10.1007/s11205-005-7156-1>.
- Peichl A., Schaefer T., Scheicher C. (2010), *Measuring Richness and Poverty: A Micro Data Application to Europe and Germany*, "Review of Income and Wealth", vol. 56(3), <https://doi.org/10.1111/j.1475-4991.2010.00404.x>.
- Pessoa D., Damico A., Jacob G. (2021), *convey: Income Concentration Analysis with Complex Survey Samples, R package version 0.2.3*, <https://CRAN.R-project.org/package=convey> (accessed: 10.02.2022).
- Piketty T., Saez E. (2003), *Income Inequality in the United States, 1913–1998*, "Quarterly Journal of Economics", vol. 118(1), <https://doi.org/10.1162/00335530360535135>.
- Radziukiewicz M. (2006), *Zasięg ubóstwa w Polsce* [The Extent of Poverty in Poland], PWE, Warszawa.
- Research Institute (2020), *Global Wealth Report 2020*, Credit Suisse Research Institute, <https://www.credit-suisse.com/media/assets/corporate/docs/about-us/research/publications/global-wealth-report-2020-en.pdf> (accessed: 30.11.2020).
- Sączewska-Piotrowska A. (2015), *Identyfikacja determinant bogactwa dochodowego z zastosowaniem modelu logitowego* [Identification of Determinants of Income Richness Using Logistic Regression Model], "Zarządzanie i Finanse", vol. 4(2).
- Sączewska-Piotrowska A. (2018), *Zamożność dochodowa gospodarstw domowych. Determinanty, dynamika, zróżnicowanie przestrzenne* [Income Affluence of Households. Determinants, Dynamics, Spatial Differentiation], Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice.
- Sen A. K. (1997), *On Economic Inequality. Expanded Edition with a Substantial Annex* by J. E. Foster and A. Sen, Clarendon Press, Oxford.
- Serwacki J. (2020), *Danina solidarnościowa – ile prawdy, ile mistyfikacji* [Solidarity Levy – How Much Truth, How Much Mystification] (in:) *W poszukiwaniu dobra wspólnego Polaków: część I*, Ł. Ospara (ed.), Art Foto Ecoformat Robert Bogudziński, Lublin.
- Törmälehto V.-M. (2017), *High Income and Affluence: Evidence from the European Union Statistics on Income and Living Conditions (EU-SILC)*, Statistical Working Papers, European Union, Brussels, <https://doi.org/10.2785/611164>.
- Wolfson M. C. (1994), *When Inequalities Diverge*, "The American Economic Review", vol. 84(2).
- Wolny-Dominiak A., Sączewska-Piotrowska A. (2021), *affluenceIndex: Affluence Indices, R package version 2.0*, <https://CRAN.R-project.org/package=affluenceIndex> (accessed: 10.02.2022).
- Zeileis A. (2014), *ineq: Measuring Inequality, Concentration, and Poverty, R package version 0.2-13*, <https://CRAN.R-project.org/package=ineq> (accessed: 10.02.2022).