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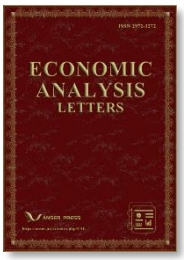

The relative persistence of income inequality and intra-generational income mobility in Poland during and after the Great Financial Crisis (2008-2015)

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ABSTRACT

Poland has experienced a very sharp rise in income and wealth inequality after the economic transition. We measure the relative persistence of income inequality and intra-generational income mobility in Poland during the period 2008-2015. Our research is based on the panel survey data, our subsample includes 501 households. To measure the persistence of income inequality we calculate Shorrocks's R coefficient. We find that if inequality is measured by the Gini index the relative persistence of income inequality in Poland is similar to Western Europe. In the case of the Theil index and the Mean Log Deviation (MLD), the relative persistence is higher than in a majority of Western Europe countries and similar to the United Kingdom or the United States. The income distribution in Poland is rather stable. Income mobility is lowest at the bottom and at the top of the income distribution. In the middle (3rd) quintile upward mobility is higher than downward mobility. The short-term income mobility in Poland has not changed during and after the Great Financial Crisis and is still medium in comparison with the rest of Europe.

KEYWORDS

Economic inequality; income distribution; Poland; persistence of inequality; income mobility

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1. Introduction

The distribution of income and economic inequality have been a topic of economic research since the birth of classical economics (Sandmo, 2015). According to David Ricardo "To determine the laws which regulate this distribution is the principal problem in Political Economy" (Ricardo, 1821). After the 1970s, the place of research on economic inequality in economic science was relatively minor. However, now after the Great Financial Crisis and the publication of "Capital in the Twenty-First Century" (Piketty, 2014) the economics of inequality entered the mainstream of economics research (Savage, 2021).

The distribution of income is most often investigated by researchers interested in economic inequality. Income inequality is usually measured on an annual basis. Yearly measurements provide, however, only snapshot information, which includes transitory income gains and losses and excludes lifetime income trajectory. If the position of households in income distribution changes over time, measures of income inequality based on annual observations are inflated in comparison with long-term inequality of standard of living. Therefore the yearly measurement of income inequality shall be accompanied by the multi-period investigation of the persistence of income inequality.

We first provide mid-term estimates of the relative persistence of inequality and income mobility in Poland. Our estimates are based on microdata from Social Diagnosis (pl. Diagnoza Społeczna) and cover the 2008-2015 period. We find that the relative persistence of inequality in Poland is similar to the other OECD economies if assessed based on the Gini index. If we switch from the Gini index to the Theil index or Mean Log Deviation (MLD) relative persistence of inequality in Poland is higher than in a majority of Western European countries and similar to the United Kingdom or the US. Income mobility is increasing with the length of the measurement period, but the position of the household in the income distribution is rather stable. The income mobility is lowest at the bottom and the top of the income distribution, while in the middle of the distribution, it is significantly higher. In the middle (3rd) quintile upward mobility is higher than downward mobility. Income mobility has not changed after the Great Financial Crisis.

2. Literature review

In recent years a body of literature on multi-period income inequality has been largely extended (Gangl, 2005; Creedy et al., 2013; Aaberge & Mogstad; 2015; Bönnke et al., 2015; Corneo, 2015; Guvenen et al., 2022,). Creedy (1999) provides an excellent review of the older literature on multi-period income inequality. Jäntti (2015) provides a comprehensive review of the literature on income mobility. The vast majority of published papers and books are, however, focused on advanced economies.

We use panel survey data to measure the relative persistence of income inequality and income mobility in Poland after the Great Financial Crisis. Income inequality in Poland experienced a very sharp rise after the economic transition (Rydliński, 2017; Brzeziński et al., 2020; Bukowski & Novokmet, 2021; Brzeziński et al., 2022), especially in the case of labor income (Keane & Prasad, 2002). Poland has entered a free market economy with a very constrained income distribution, but today is one of the most unequal EU countries. Atkinson & Micklewright (1993) and Flemming & Micklewright (2000) discuss the impact of transition on income inequality in Poland and other former central plan economies.

Research on wealth inequality shows that despite only 25 years of unconstrained wealth accumulation the wealth inequality in Poland to a large extent caught up with wealth inequality levels in Western Europe (Brzeziński et al., 2020). The top-wealth adjustment of wealth inequality measures (Kennickel, 2017a, 2017b, 2019; Bach, 2019) in Poland and other Central and Eastern European economies is higher than in Western Europe (Brzeziński et al., 2020). Social security wealth only moderately decreases (augmented) wealth inequality in the country (Wroński,

2023). This shows that surveys in Poland and other CEE to a lower extent capture top-wealth holders. This limitation may be important also in the case of income. The multidimensional inequality in the country is to some extent reduced by the relatively low correlation between income and wealth distribution due to the privatization of state-owned housing assets during the economic transition (Wroński, 2021). Interestingly, the wealth of Polish households is relatively high in comparison with the other CEE countries (Wroński, 2022).

Aristeri and Perugini (2015a) asses income volatility in Europe using 2004-2006 EU-SILC data and find relatively high levels of short-term income mobility in Poland. Aristeri and Perugini (2015b) investigate the short-term income mobility in new EU member states during the period 2008-12 using EU-SILC data. According to their estimates, income mobility in Poland was mid-high in that period. Similarly, as in the case of the previous paper (2015a) Aristeri and Perugini (2015b) provide only a short-term assessment of income mobility while we first provide the estimates of the inequality persistence and income mobility in Poland over a longer period. Research of Aristeri and Perugini (2015a, 2015b) is based on EU-SILC data, which limits the panel length to 4 years. We use a new data source, and therefore, we can extend the measurement period. We provide estimates of the relative persistence of income inequality in the 2008-2015 period.

The literature on income mobility in Central and Eastern European countries is very limited and concentrated on the first period of economic transition. Rutkowski (2001) and Kapitány & Molnár (2004) investigate income mobility during the mid-90s in Hungary. They assess income mobility in Hungary as high in comparison with OECD countries but decreasing. Hauser and Fabig (1999) compare income mobility in eastern and western states of Germany during 1999s and similarly conclude that the income mobility in eastern states was high in the first years of economic transition, but decreased after 1995.

3. Data and method

We use Social Diagnosis (2015) data[1]. Social Diagnosis is a long-term panel study conducted in Poland from 1991 until 2015. After 2015 Social Diagnosis is not continued. Social Diagnosis collects rich data on all significant aspects of life as well as economic (income, consumption, wealth) as non-economic (e.g., education, participation in arts and culture, value judgments, and moral attitudes) ones. By choosing Social Diagnosis instead of EU-SILC, we are not constrained by the short EU-SILC panel length (only four years) and may evaluate the relative persistence of income inequality and income mobility over a longer period.

In the survey, income is measured at the household level. In each wave, respondents provide information about the mean monthly income during the previous year and the income in the month of the survey. To calculate multi-period average incomes, we deflate incomes by the CPI. We measure the relative persistence of inequality and income mobility for households participating in the last four waves of Social Diagnosis (2009, 2011, 2013, 2015). We limit our sample to households with heads older than 25 and younger than 50 years, which participated in all waves of the survey over the measurement period and have non-zero and non-missing incomes. Such limitation is common in the literature. It allows for the investigation of the relative persistence of income inequality among prime working-age households and limits the impact of life-cycle trajectory on results. Although the investigation of income inequality and its relative persistence over the life cycle is also very interesting, our data source and other data sources available for the Polish economy are too short for this aim.

Table I presents descriptive statistics on income in our subsample and the survey sample. Our subsample includes 501 households. The limited sample size is caused by the relatively low retention of households in the panel (household needs to stay in the panel for 8 years to be included), and classification criteria (age). Unfortunately, Social Diagnosis is the only source, which can be used to measure the persistence of income

[1] Social Diagnosis data is available to researchers on www.diagnoza.com.

inequality in the studied period.

They are significantly younger than the survey sample (mean age in 2009: 42.6 vs. 54.5) and have higher incomes (ca. 25% higher at mean). Income inequalities are lower in our subsample than in the survey sample. These differences are not surprising. Our subsample includes the prime working-age group and excludes pensioners, which usually have lower incomes.

Table 1. Descriptive statistics.

Panel A: Survey sample				
Year	Income	Gini	Theil	MLD
2008	2727(2198)	0.347	0.219	0.210
2009	2777(2023)	0.343	0.203	0.203
2010	3069(2514)	0.346	0.221	0.209
2011	3079(2197)	0.337	0.197	0.199
2012	3260(2498)	0.342	0.210	0.204
2013	3235(2259)	0.335	0.192	0.196
2014	3466(2434)	0.336	0.194	0.196
2015	3522(2438)	0.336	0.192	0.196
Panel B: Our subsample				
Year	Income	Gini	Theil	MLD
2008	3208(2294)	0.303	0.172	0.160
2009	3401(2748)	0.324	0.202	0.184
2010	3620(2849)	0.324	0.202	0.180
2011	3679(2414)	0.307	0.166	0.162
2012	3887(2742)	0.317	0.183	0.176
2013	3996(2679)	0.316	0.176	0.174
2014	4184(2602)	0.305	0.161	0.167
2015	4358(2721)	0.307	0.162	0.169

Note: Income is given in zlotys (PLN). Standard deviation in parentheses. Source: own calculation using Social Diagnosis (2015) data.

We follow Gangl (2005), and to provide a holistic view of multi-period inequality, we use three different inequality indices. They put different weights on each part of the income distribution. We use the Gini Index, Theil index, and Mean Log Deviation (MLD). The Gini index is most sensitive to inequalities in the central part of the income distribution, the MLD puts the highest weight on the lower tail of income distribution, and the Theil index is especially prone to the higher tail of the income distribution (see Cowell, 2011 for definitions and discussion). We estimate three different metrics of inequality to better assess the persistence of it. As we discuss in the paper, the research outcomes are partially dependent on the metrics used.

We use Shorrocks' R (Shorrocks, 1978) as the measure of the relative persistence of income inequality. Shorrocks' R is given as the ratio of the inequality of multi-period (average) incomes Ym to the weighted average of inequalities of annual values Yt with weights chosen proportional to mean annual incomes.

$$R = \frac{I(Y^m)}{\sum_{t=1}^{T} w_k Y^t} \tag{1}$$

where

$$w_k = \frac{\mu(t_{k-1}, t_k)}{\mu(t_0, t_m)} \tag{2}$$

Shorrocks' R is always less than or equal to one. The difference between the one and Shorrocks's R may be interpreted as a relative reduction of inequality achieved through income mobility over time. If income mobility is higher, then the inequality is less persistent and Shorrocks's R is lower.

We measure Shorrock's R for 2, 4, 6, and 8 years. In a mobile society, Shorrock's R should be significantly lower for longer periods. Shorrock's R for 2, and 4 years may be treated as the measure of short-term mobility, while estimates for 6, and 8 years may be treated as measures of mid/long-term mobility. Probably, estimates for longer periods are most important, because they limit the impact of short-term, random exogenous shocks (like unemployment) and provide a measure of true, background mobility.

We also estimate transition matrices among income quintiles to measure income mobility. We chose to divide the survey sample into quintiles (one-fifths of the population) instead of deciles because of the spiking of income. As indicated above, the value of income is self-assessed by respondents, which results in spikes at some round values. If we divide the population into deciles, the same values must be in the same deciles, which results in an unequal size of deciles. In the case of quintiles, the problem of the unequal size of quantiles is limited. We use Spearman's rank correlation and Shorrocks's M (equal to 1- R) as supplementary "single-digit" measures of income mobility.

Our estimates are based on survey data, which may underreport top incomes. Top income and top wealth holders participate less often in surveys (Bricker et al., 2016; Burkhauser et al., 2018; Bartels & Metzing, 2019) Recent publications of the Ministry of Finance based on income-tax data show that income inequality is measured based on administrative data is much higher than income inequality measured based on survey data. Unfortunately, administrative data on household incomes in Poland are not available to researchers. However, even if we may underestimate income inequality, the impact of top-income holders on the measures of relative persistence of income inequality and income mobility is limited, because their share in the population is small.

4. Results

Estimates of the relative persistence of income inequality in Poland are presented in Table 2. An increase in the length of the measurement period lowers income inequality and its relative persistence. The relative persistence of inequality is highest in the case of the Gini index, which loses 2% of value over two years, 8% over four years, 10% over six years, and 13% over eight years.

The relative persistence of income inequality is lower if inequality is measured by the Theil index or the MLD. This difference may arise because the Theil index and MLD-based estimates of relative persistence of income inequality give greater weight to the mobility in the tails of the distribution than Gini-based estimates do. The relative persistence of the Theil index and MLD is very similar. In both cases inequality index decreased by 4 % over two years, ca. 15% over four years, 21% over six years, and 25% over eight years.

Table 2. The relative persistence of income inequality in Poland: 2008-15.

Year	Gini	Theil	MLD
Min	0.303	0.161	0.160
Max	0.324	0.202	0.184
2 years average incomes (2008-9)	0.308	0.179	0.165
4 years average incomes (2008-11)	0.291	0.156	0.146
6 years average incomes (2008-13)	0.282	0.145	0.138
8 years average incomes (2008-15)	0.273	0.135	0.129
Relative persistence 2 years	0.980	0.958	0.955
Relative persistence 4 years	0.924	0.836	0.847
Relative persistence 6 years	0.894	0.790	0.794
Relative persistence 8 years	0.872	0.756	0.752

Note: Relative persistence … is the Shorrocks' R. calculated for the given period. Source: own calculation using Social Diagnosis (2015) data.

If we compare our results with Gangl (2005), who calculated Shorrocks's R for 12 OECD countries in the period 1994-1999 relative persistence of inequality in Poland is medium in the case of the Gini index and high if inequality is measured by Theil index and MLD. The relative persistence of inequality measured by the Gini index over eight years in Poland is similar to in the Netherlands, Italy, or Greece, lower than in Denmark and Belgium and higher than in the United States, Germany, and Portugal. If we instead of the Gini index compare the persistence of Theil index and MLD only Germany, Portugal, the United Kingdom, and the United States have similar values of Shorrocks's R. Therefore, we assess the inequality persistence in Poland as medium-to-high.

To directly compare our results with the results of Aristeri and Perugini (2015a), we separately calculated the value of Shorrocks's R and M for three years period (2008-2010). In this case, similar to Aristeri and Perugini, we use the Gini index as the sole inequality measure. The Shorrocks's R is equal to 0.934, and thence Shorrocks's M is equal to 0.066. The value of M is nearly identical to 0.063 obtained by Aristeri and Perugini (2015a). If we recalculate the short-term 3-years measure for the period 2013-2015, we obtain nearly identical results - Shorrocks's R is equal to 0.933, and thence Shorrocks's M is equal to 0.067. The short-term (3 years) income mobility has not changed during and after the Great Financial Crisis and is still medium in comparison with the rest of Europe. A comparison of mid-term (8 year) income mobility measured by Shorrocks's M with the rest of Europe is not possible, because of the lack of literature.

Mobility among income quintiles over two years (2008-9) is presented in Table 3 In Table 4, we present the mobility among income quintiles over eight years (2008-15). Income mobility is increasing over time. In the two-year period Spearman's rank correlation coefficient is equal to 0.862, while in the eight-year period, it is equal to 0.494. The Shorrocks' M is equal to 0.020 and 0.128 if income inequality is measured by the Gini index.

Table 3. Mobility among income quintiles: 2008-2009.

Q2008/Q2009	1	2	3	4	5
1	87,50%	10,42%	0,00%	2,08%	0,00%
2	10,58%	60,68%	16,35%	12,50%	0,00%
3	1,23%	13,58%	58,02%	24,69%	2,47%
4	0,78%	3,13%	12,50%	65,63%	17,97%
5	0,00%	1,43%	2,14%	10,71%	85,71%

Source: own calculation using Social Diagnosis (2015) data.

Table 4. Mobility among income quintiles: 2008-2015.

Q2008/Q2015	1	2	3	4	5
1	56,25%	22,92%	8,33%	8,33%	4,17%
2	12,50%	20,19%	30,77%	21,15%	15,38%
3	7,41%	13,58%	39,51%	20,99%	18,25%
4	3,91%	12,50%	22,26%	35,94%	25,00%
5	2,86%	5,71%	10,00%	24,29%	57,14%

Source: own calculation using Social Diagnosis (2015) data.

In 9 of 10 cases (5x2), the probability of remaining in the given income quintile is higher than the probability of moving to other quintiles. Therefore we assess the income distribution in Poland as stable. The one outlier is the income mobility from the 2nd quintile over eight years – households, which were in the 2nd quintile in 2008 have a higher probability of moving to the 3rd quintile (30,77%) in 2015 than remaining in the 2nd quintile (20,19%).

The first and fifth income quintiles are the least mobile. During two years, over 85% of households belonging to the bottom or the top quintile of income distribution remain in the respective quintile. Over eight years, more than 50 percent of households belonging to the bottom or the top quintile remain in their quintile. The middle of the income distribution is more mobile. Over two years, more than 40% of households leave the 3rd quintile of the

income distribution, and upward mobility is higher than downward mobility. If we switch to the measurement over eight years, the 2nd quintile is the most mobile.

5. Conclusion

In this paper, we use Social Diagnosis (pl: Diagnoza Społeczna) panel data to measure the relative persistence of income inequality and income mobility in Poland in the period 2008-2015. Although, the literature on multi-period inequality measurement is growing the multi-period inequality in Poland has not been investigated before.

Our sample includes prime working-age households. To measure the relative persistence of income mobility we estimate Shorrocks' R, and to assess the income mobility we estimate transition matrices. The estimations of Shorrock's persistence coefficients allow for a comparison of our results with results for other European countries.

We find that income inequality measured over eight years is 13-25% lower than measured annually, depending on the inequality index. The relative persistence of income inequality in Poland in comparison with other EU economies may be assessed as mid (Gini index) or relatively high (MLD, Theil Index).

The position of household income distribution in Poland is rather stable. The income mobility is lowest at the bottom and the top of the distribution, and it is significantly higher in the middle of the distribution. In the middle (3rd) quintile upward mobility is higher than downward mobility. A comparison of our results with the results of Aristeri and Perugini (2015a) shows that short-term (3 years) income mobility in Poland has not changed after the Great Financial Crisis.

Our research provides estimates of the relative persistence of income inequality and income mobility in the 2008-2015 period. It would be very interesting to extend these measures in time, especially in the 1990s. Theoretically, a similar analysis may be performed in the case of wealth distribution, but as far as we know the case of the Poland dataset which allows for the investigation of the persistence of inequality and mobility over mid-term is not available today.

Our research shows that income inequality in Poland decreases only moderately with the extension of the measurement period. Therefore it's not caused by the life cycle or random external shocks. This increases the importance of addressing economic inequality through public policy tools. Moreover, the distributional impact of current public policy should be investigated.

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

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