The Economic and Social Review, Vol. 52, No. 4 Winter 2021, pp. 375-396

Income Inequalities in Ireland and Poland: The Role of Taxes and Social Transfers

Joanna Muszyńska
Nicolaus Copernicus University in Torun

Małgorzata Szczepaniak
Nicolaus Copernicus University in Torun

Ewa Wędrowska*
Nicolaus Copernicus University in Torun

Abstract: Even though Ireland and Poland differ in their GNI levels per capita, economic history and economic systems, their levels of income inequality calculated on disposable income were very similar in 2016. However, there is a lack of current research comparing these countries from the perspective of tax-benefit systems that alleviate inequality. Therefore, this paper seeks to answer the research question of whether the differences in welfare state regimes that shape tax-benefit systems in Poland and Ireland are reflected by the role the taxes and social transfers play in tackling inequality. Our study is based on microdata from the European Union Statistics on Income and Living Conditions (EU-SILC) survey. We apply a factor decomposition to determine what roles various factor components play in determining overall inequality. The results reveal that the redistributive effect was stronger in Ireland, resulting in greater income inequality reduction than in Poland through policies affecting the unemployed, families and taxes.

Acknowledgments: This paper is prepared as part of the research project: Income and Inequality of Income of European Households (Eurostat, No.: 162/2018-EU-SILC) and is based on data from Eurostat, EU Statistics on Income and Living Conditions – EU-SILC CROSS-SECTIONAL UDB 2016 – version 2018. The responsibility for all conclusions drawn from the data lies entirely with the authors. The authors are solely responsible for the content and the views expressed.

* Corresponding author: ewaw@umk.pl

I INTRODUCTION

Since the global economic crisis, there has been renewed interest in understanding the role of taxes and social transfers in levelling income inequality. However, to our knowledge, there has been a lack of comparative studies concerning solely Ireland and Poland. The outcomes of empirical studies regarding income inequality in Ireland and the impact of the economic crisis on the level of income inequality can be found in the works of Nolan *et al.* (2013), O'Donoghue *et al.* (2013; 2018) and Callan *et al.* (2013). The impact of redistributive policies on income inequality in Ireland has been analysed by Bargain *et al.* (2017), Savage *et al.* (2018), Callan *et al.* (2013) and Kennedy *et al.* (2016). In the case of Poland, the role of taxes and the social policy of the state in shaping income inequality has rarely been analysed. The few existing results in this area are presented in the papers by Aksman (2015), Myck and Najsztub (2016), Brzeziński (2018), Graca-Gelert (2018) and Wędrowska and Muszyńska (2019). Our study adds to this existing body of research by explicitly focusing on comparing the factors that shape inequality in Ireland and Poland. The rationale for this comparison is based on two strongly interrelated reasons.

The first reason is the different position of these two countries in the welfare state typology. Ireland is classified as a liberal welfare state with modest social transfers, the recipients of which belong mainly to low-income groups (Esping-Andersen, 1990, p. 27). Freedom is taken to be the highest value, and the role of the state is seen more as creating conditions that are optimal for development. However, treating Ireland as a purely liberal welfare state has been criticised (Dukelow and Murphy, 2016), and it is often suggested that Ireland should be placed at a somewhat intermediary position between corporatist and liberal. Ireland's social protection system is sometimes described as competitive corporatist because transfers, taxation and labour market institutions were broadly adapted to competitiveness objectives, albeit with a focus on the central role of the family (Bargain *et al.*, 2017). Poland is classified as a social market economic system, although the term social market economy included in its constitution is the result of the transformation of Polish social policy in the 1990s (Grewiński, 2017). In this regime, universalism of social rights dominates. The result is a welfare state that grants transfers directly and takes responsibility for caring for children, the elderly and the vulnerable (Esping-Andersen, 1990, p. 28). There is a belief that redistribution is appropriate, and that egalitarianism is an ideal of justice (Brady, 2009). However, as the economy of Eastern Europe transitioned, Poland was obliged to adjust social policy regulations in accordance with common social and labour market policy in the European Union, and is still in the process of shaping its rules (Anioł, 2003).

Paradoxically, even though the Irish economic system can be described as a more liberal welfare state, taxes and social transfers have decreased the disposable income inequality in Ireland to a greater extent than in Poland. Poland, during the transitional years and at the beginning of its accession to the EU, experienced a sharp increase in income inequality (Milanovic, 1999; Mitra and Yemtsov, 2006; Rosser *et al.*, 2000). The Gini coefficient is commonly used to analyse income inequality measures and the extent to which the distribution of income within a population deviates from a perfectly equal distribution. A coefficient of 0 indicates perfect equality, where everyone has the same income, while a coefficient of 100 indicates full inequality, where only one person has all the income (Eurostat, 2019). In 2006, inequalities in income before transfers were higher in Poland ($Gini_{\text{before transfers}} = 53.0$) than in Ireland ($Gini_{\text{before transfers}} = 48.5$). European Union Statistics on Income and Living Conditions (EU-SILC) data show that from 2006 to 2016, inequalities in both market and disposable income were gradually decreasing in Poland.[1] As a result of these changes, the inequalities in income before social transfers were lower in Poland (Gini = 46.7) than in Ireland (Gini = 50.2) in 2016; however, the Gini coefficients of equivalised disposable income were comparable (Table 1).

Table 1: Gini Coefficients in Poland and in Ireland in the Period 2006-2016

Year	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
Gini coefficient of equivalised disposable income before social transfers (pensions included in social transfers)											
Ireland	48.5	48.2	48.2	50.1	53.9	54.1	53.4	54.3	53.5	51.1	50.2
Poland	53.0	51.4	49.8	48.2	47.9	47.8	47.5	47.7	47.9	47.9	46.7
Gini coefficient of equivalised disposable income – EU-SILC survey											
Ireland	31.9	31.3	29.9	28.8	30.7	29.8	30.5	30.7	31.1	29.8	29.5
Poland	33.3	32.2	32.0	31.4	31.1	31.1	30.9	30.7	30.8	30.6	29.8

Source: Eurostat.
https://ec.europa.eu/eurostat/statisticsexplained/index.php/EU_statistics_on_income_and_living_conditions_(EU-SILC)_methodology_-_distribution_of_income

The second reason is that while taxes and social transfer systems alleviate income inequalities, the structure of those systems is different in Ireland and Poland. Comparison of these tax and transfer systems reveals diversity between the countries with respect to the fundamental characteristics of those systems. Even though the share of government expenditures on social protection as the percentage of total government expenditures was higher in Poland than in Ireland, the absolute

[1] This was also confirmed by Myck and Najsztub (2016) based on data from the Polish Household Budget Surveys, although they indicated a higher level of inequality.

per capita value of government expenditures on social protection was much higher in Ireland (Table 2). Moreover, higher relative involvement of the state through public finances was identified in Ireland, with tax revenues of 26 per cent of gross national income (GNI), in comparison to Poland, where it was 15 per cent of GNI. Furthermore, the introduction of higher personal income tax (PIT); personal allowances and tax credits, especially for families with children; and a universal social charge (USC) in Ireland made its tax system more progressive than in Poland (Verbist and Figari, 2014). Interestingly, the top PIT rates decreased in both countries in comparison to the pre-crisis period. Ireland responded to the crisis with additional personal taxation via the USC. This spread the income tax net much more widely and likely had a significant impact on the change in income inequality over the period observed. The USC is a tax on income that replaced both the income levy and the health levy (also known as the health contribution) starting in 2011. This was an important income equalising instrument because it is broad based and paid only if gross income is more than €13,000 per year, thus protecting the poorest citizens.

Table 2: Comparison of Fundamental Elements of Tax and Transfer Systems in Ireland and Poland in 2016

System	*Elements*	*Ireland*	*Poland*
Social transfers system	Government expenditures on social protection as percentage of total government expenditures	36%	41%
	Government expenditures on social protection (PPS per inhabitant)	7,182	4,638
Tax system	PIT rate (%)	20; 40	18; 32
	CIT rate (%)	12.5	19
	Extra taxes paid on gross income (except PIT and pay-related social insurance)	USC	
	Total tax revenue (%GNI)	26	15

Sources: Eurostat and OECD (tax revenue; %GNI).
Note: PPS = purchasing power parity; PIT = personal income tax; CIT = corporate income tax; USC = universal social charge; GNI = Gross National Income.

Based on Table 2, we aim to verify the hypothesis that the tax and social transfer system played a more important role in tackling inequality in Ireland than in Poland. Therefore, we focus on the method of decomposition in the analysis of relationships between inequalities and redistributive policies to find an answer to the question of which state transfers and taxes decreased inequality and which ones increased it in both countries. This type of analysis can also answer the question of the

effectiveness of the state's redistributive policy in decreasing inequality and allow for comparison between the two countries.

The remainder of this article is organised as follows. Section II discusses the literature concerning the relationships between income inequality and the state's redistributive policy through taxes and social transfers. The data and analysis methods are described in Section III. The results of the empirical analysis are presented in Section IV. The last section offers our concluding remarks.

II THE IMPACT OF REDISTRIBUTION POLICY (TAXES AND SOCIAL TRANSFERS) ON INCOME INEQUALITIES – LITERATURE REVIEW

From a theoretical point of view, our study is based on new institutional economics, according to which the state funds market intervention, enforcement of the rules and the existence of institutions' official authorities and rules (North, 1990). The state institutions, which are responsible for creating the system of transfers and the tax system, contribute to the level of disposable income as well as create a system of motivation and incentives that encourage individuals to work. Thus, according to this theory, the state's redistributive policy ultimately affects income inequality (Atkinson, 1996; Beblo and Knaus, 2001; Esping-Andersen and Myles, 2007).

The impact of taxes and transfers on the distribution of income can be considered from two angles: discretionary policy and automatic stabilisers. The role of the latter is connected with the business cycle, progressive tax systems and welfare policy, through which the automatic response of taxes and transfers to changing gross income (e.g. unemployment benefits protect against loss of work income) can be analysed. According to Savage *et al.* (2018), the increase in redistribution during the crisis in Ireland can be explained mostly by the role of automatic stabilisers. Transfers and taxes moderated inequalities and protected the incomes of the poorest against a decrease. However, a government can also counteract inequalities through direct active policy (e.g. by changing the level of transfers or access to them or by tax system changes). However, the distinction between the impact of policy changes and the impact of automatic stabilisation is often difficult to disentangle.

The empirical results from the literature concerning the impact of redistributive policy on income inequality are ambiguous as to a solution to the problem of whether targeting benefits towards the bottom part of the income distribution actually enhances the redistributive impact of welfare state policies (Marx *et al.*, 2015, p. 20). Doerrenberg and Peichl (2012), based on analyses of OECD countries, and Giammatteo (2006), referring to countries in transition, demonstrated that transfers reduce inequalities more than the degree of progressivity in the tax system.

Caminada *et al.* (2019) presented similar results; however, they included pensions in the social transfers in their analysis. In contrast, Alves (2012) concluded that the tax redistributive effect was stronger than that of transfers in Portugal. Fuest *et al.* (2010) suggested that tax and transfer systems substantially reduced income inequality in all European countries. The factor source decomposition approach, however, suggests that benefits play a negligible role and sometimes even slightly increase inequality. According to that approach, taxes and social contributions are by far the most important contributors to income inequality reduction (Fuest *et al.*, 2010).

In a broader sense, analyses have been conducted on the role of taxes and transfers in indirectly decreasing inequalities through higher GDP growth rates. Jenkins *et al.* (2013) highlighted the extent to which social protection and tax systems cushioned the immediate impact of declining household incomes. Schwabish *et al.* (2006) analysed some reverse causality relations and determined that redistributive policies have some impact on levels of inequality, but inequality simultaneously influences government policies. Redistributive policies such as progressive taxes or social benefits can reduce incentives to work or to invest and therefore result in lower GDP growth (Roed and Strom, 2002). Tax and transfer policies together with other institutions on labour market determine the system of rules and incentives for earning money and affect labour market participants' behaviour, their income and therefore income inequalities (Szczepaniak and Szulc-Obłoza, 2020).

Exploring links between income inequality and redistribution policies, Lindbeck (2008) indicated possible reforms to deal with inequalities. From his perspective, the welfare state should aim not only for redistributional achievements but also efficiency gains. The author also identified new demands for welfare states, such as increased participation of women in the labour force as well as increased demand for subsidised childcare and old age care. In this sense, higher transfers may result not only in lower inequality but also in higher participation in the labour market and thus higher GDP (Lindbeck, 2008). Public finances may also relate to income inequality because the state may decide to finance increased public spending (and social protection) through a higher deficit and national debt to decrease inequality in the short term. In the long term, however, it may increase the interest on national debt and make changes to tax and social policy (increases in taxes and decreases in the level of social transfers).

It is important to stress that the state can affect the distribution of income in many ways apart from taxes and transfers (Atkinson, 1996, p. 41). There are many other policies and regulations that are created by the state, such as the conditions of doing business, minimum wage legislation and trade union legislation, that can have an indirect impact on income inequality. Thus, redistribution strategies based on government transfers and taxes alone would be neither effective nor financially

sustainable and should be supported by other policies such as labour market policies (OECD, 2011).

III DATA AND METHODOLOGY

This study is based on household survey data from Poland and Ireland from the years 2006, 2010 and 2016. The time period corresponds to Poland's accession to the EU, the economic crisis and the most recent year for which comparable data are available. We used microdata from the EU-SILC survey extracted from the cross-sectional EU-SILC dataset (EU-SILC CROSS-SECTIONAL UDB 2016 – September 2018 version). The survey contained data from approximately 12,000 to 15,000 households and from 32,600 to 45,100 individuals in Poland. The size of the Irish sample ranged from 4,600 to 5,800 households and from 11,600 to 14,600 individuals.

For the composition and decomposition analysis, our income concept was the annual equivalised household disposable income per household member. For all results, we size-adjusted household income, which accounts for economies of scale in household consumption, by dividing total income by the equivalised household size and assigning this value to each household member.[2] Data were weighted using personal cross-sectional weights. Total household disposable income was calculated as the sum of gross personal income components plus gross income components for all household members at the household level minus taxes and social contributions.

As in other studies, we considered the three main sources of income: market income, social transfers and taxes. In order to better understand how different components of household income affected total income inequality, we examined ten components of income: earnings, self-employment income, residual category of market income, old age and survivor's benefits, unemployment benefits, family and children-related allowances, housing allowances, sickness and disability benefits, residual category of social transfers and taxes. In addition, we were able to identify sources of income characterising the economic policy in terms of expenditures on social protection. Table 3 reports the definitions of the income categories used in our study based on the EU-SILC descriptions of the user database variables.

Since the selection of the measure of inequality depends not only on the aim of the study but also on its effect on the results, in our study we decided to use the Gini coefficient, which is probably the most widely used measure of income inequality. Its popularity can be attributed to its computational simplicity, intuitive interpretation and availability in many databases. An important advantage of the

[2] We used the OECD-modified equivalence scale. This scale assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.

Table. 3: Income Categories Used in the Analysis

Variable	*Definition*		
Earnings	Gross employee cash or near cash income	Labour income	Market income
Self-employment	Gross cash benefits or losses from self-employment (including royalties)	Labour income	Market income
Non-labour income	• Non-cash employee income • Pensions from individual private plans • Income from the rental of a property or land • Regular inter-household cash transfers received • Interests, dividends and profit from capital investments in unincorporated business • Income received by people under 16 years of age	Residual categories of market income	Market income
Pensions	• Old age benefits • Survivor's benefits		Social transfers
Unemployment	• Unemployment benefits		Social transfers
Child benefits	• Family/children-related allowances		Social transfers
Housing	• Housing allowances		Social transfers
Sickness	• Sickness benefits • Disability benefits		Social transfers
Other social benefits	• Education-related allowances • Social exclusion not elsewhere classified		Social transfers
Taxes	• Tax on income and social insurance contributions • Regular inter-household cash transfer paid • Regular taxes on wealth		Taxes

Source: Authors' definitions based on description of SILC user database variables.

Gini index is that it satisfies the four main principles that any inequality metric should meet to be considered a reliable measure: the transfer principle, scale independence, the anonymity principle and population independence (Charles-Coll, 2011, p. 26).

In order to assess the extent to which various income sources contribute to the formation of inequalities, we applied Lerman and Yitzhaki's (1985) methodology to decompose the Gini coefficient for Poland and Ireland for the years 2006, 2010 and 2016. Let us consider a population of n households denoted by i, with mean income μ and variance σ^2. We assume that the household income consists of K income components. The income from the source k ($k = 1,\ldots, K$) for the household i equals Y_{ik}. The distribution of incomes from source k is $Y_k = (Y_{1k}, Y_{2k},\ldots, Y_{nk})$, the distribution of total incomes is $Y = (Y_1, Y_2,\ldots, Y_n)$ and the total income for the household i is $Y_i = \Sigma_k Y_{ik}$.

According to Lerman and Yitzhaki (1985), the Gini coefficient, denoted by G, can be expressed as:

$$G = \Sigma_{k=1}^{K} s_k G_k R_k, \tag{1}$$

where s_k represents the share of source k in total income ($s_k = \mu_k/\mu$), μ_k is the mean income from the source k, G_k is the Gini coefficient of income source k and R_k is the Gini correlation between income source k and total income.[3]

The Gini correlation is a form of rank correlation coefficient and presents the ratio of covariances: $R_k = cov(Y_k; F)/cov(Y_k; F_k)$, where F_k is the cumulative distribution of income source k, and F is the cumulative distribution of disposable income. In other words, it measures the extent to which the relationship between Y_k and the cumulative rank distribution of Y coincides with the relationship between Y_k and its own cumulative rank distribution F_k.

Based on Equation (1), the influence of any income source upon total inequality can be assessed. The absolute contribution of each income source k to total inequality C_k is equal to the product of three elements: the share of that source in total income, s_k; the Gini coefficient of that income source, G_k; and its Gini correlation, R_k:

$$C_k = s_k G_k R_k. \tag{2}$$

The proportional contribution of each income source to total inequality is given by the ratio between C_k and Gini: $c_k = C_k/G$.

The Gini decomposition proposed by Lerman and Yitzhaki (1985) allowed us to estimate the marginal effect of changes in each income source on inequality (i.e. to verify how changes in the size of a particular income source affected the overall income inequality, holding income from all other sources constant). Lerman and Yitzhaki (1985) showed the effect of a small change, e_k, in each household's income from source k on overall inequality. The partial derivative of the overall Gini with respect to a 1 per cent change in income from source k gives the marginal impact of this income source on overall income inequality:

$$\frac{\partial G}{\partial e_k} = s_k(R_k G_k - G). \tag{3}$$

Lerman and Yitzhaki (1985) also showed that dividing Equation (3) by the overall Gini yields the source marginal effect relative to the overall Gini, which can be written as the source's inequality contribution as a percentage of the overall Gini minus the source's share of total income:

[3] Gini correlation R_k belongs to the range [–1, 1] and is equal to 0 if a particular component k and disposable income inequality are independent or to 1 (–1) if they are perfectly positively (negatively) correlated.

$$\frac{\partial G/\partial e_k}{G} = \frac{s_k(R_k G_k}{G} - s_k. \quad (4)$$

A negative sign for the factor's marginal effect means that a marginal increase in the source has an equalising effect. The sum of relative marginal effects is zero. Multiplying all sources by *e* leaves the overall Gini unchanged.

IV EMPIRICAL RESULTS

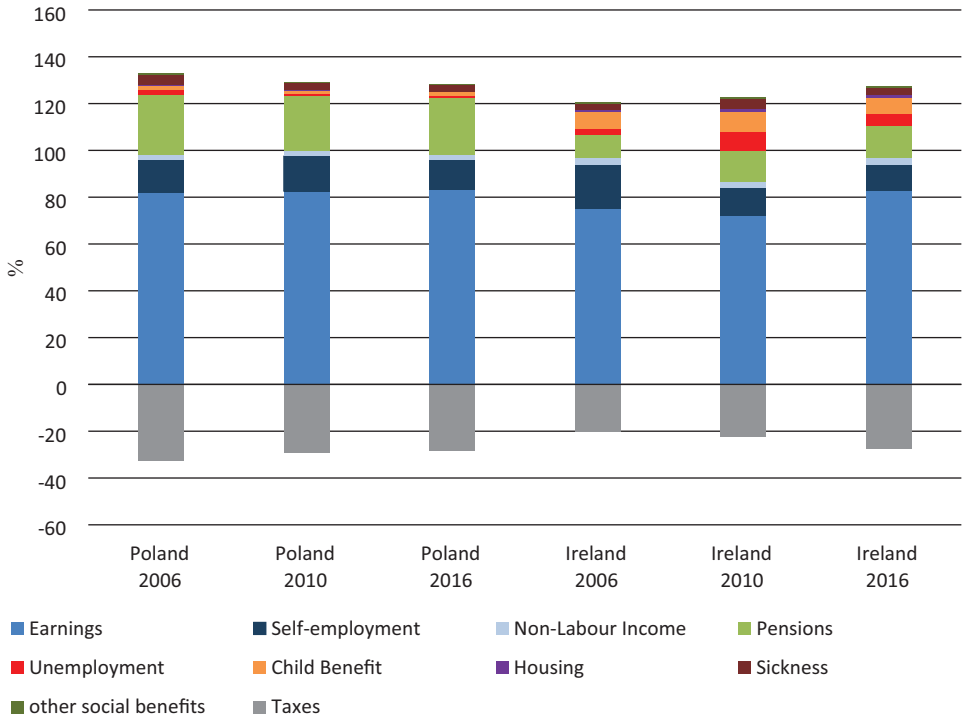
4.1 Household Income Composition by Source

Before presenting the inequality decomposition results, we discuss the share of components in total equivalised household disposable income. Figure 1 reports the shares of source *k* in total disposable income for Poland and Ireland for 2006, 2010 and 2016, allowing us to compare them over the same period. The grey shaded areas in Figure 1 display the share of taxes in household disposable income, the blue shaded areas show the shares of market income in household disposable income and the other areas display the shares of social transfers in household disposable income. Because we wanted to focus on disposable income, the share of the first two sources (market income and social transfers) in total income adds up to over 100 per cent, while the third factor (tax on income and social insurance contributions) is negative, capturing the redistributive effect of taxes.

When analysing the composition of household income, we observed some differences between the two countries. Firstly, the differences were related to changes in composition over time. In Poland, the structure of household income was relatively stable over time, while it varied in Ireland. It can be assumed that changes in composition in household disposable income in Ireland were caused by changes in the labour market and in tax-transfer policies that were introduced as a response to the crisis. In Poland, households' budget composition did not change much over the period considered, indicating that the crisis did not reshape households' budgets. Secondly, the income composition reflected the state policy. Figure 1 shows the share of income from social transfers.

As expected, labour income was by far the largest source of household disposable income in both countries (see Figure 1). It was the dominant component of total disposable income, and it can be further broken down into earnings and self-employment income. In 2006 and 2010, the share of earnings in total disposable income was clearly higher in Poland (81.9 per cent and 82.5 per cent), compared to Ireland (74.8 per cent and 72.2 per cent), while in 2016, the share of this component was similar in both countries (83.3 per cent in Poland and 82.7 per cent in Ireland). In Ireland, this share varied over time and was the lowest in 2010. For the latest observed period, however, the share of earnings in household disposable

Figure 1: Composition of Household Disposable Income by Source



Source: Authors' calculation using EU-SILC data.
Note: See Table 4 for sources. The shares of source *k* in total disposable income for Poland and Ireland are reported in Table 4, Columns 3 and 6, respectively.

income was at a higher level than in the pre-crisis period. The Irish employment rate was 69.0 per cent in 2006 but fell sharply in 2010 to 60.2 per cent and rose again in 2016 to 67.1 per cent, while in Poland this ratio increased from 55.7 per cent in 2006 to 59.2 per cent in 2010 and 65.1 per cent in 2016. These differences in the share of employment income and employment rates in both countries partly reflect the labour market profile. In Ireland, the decline in the share of employment income in 2010 was more gradual than the decline in the proportion of people with employment income, indicating that average earnings dropped slower than the number of workers.

A large proportion of labour income consists of earnings, while self-employment income is less important. Table 4 (Columns 3 and 6) shows that in 2006, the share of household disposable income coming from self-employment was higher in Ireland than in Poland. However, the shares were higher in Poland than in Ireland in subsequent years. Curiously, the proportion of self-employed people ages 15-64 as a percentage of total employment was significantly higher in Poland than in Ireland throughout the entire period. In contrast to total labour income, the

other components of market income combined – investment income, private retirement income and other private incomes – contributed less in Poland than in Ireland.

The next significant components of income were old age and survivor's benefits, which represented a much higher proportion of Polish household income than Irish household income. The old age dependency ratio was higher in Poland. In 2016, it was 23 per cent in Poland and 20 per cent in Ireland (the lowest in EU28) (Eurostat, 2019). However, this was not the only reason for such a large difference in the shares of old age and survivor's benefits. In Ireland, the average earnings were six to eight times higher than the average old age and survivor's benefits, while they were only three times higher in Poland. Furthermore, a higher share of government expenditures on old age was observed in Poland (22 per cent) than in Ireland (13 per cent). A higher share of elderly people (65 and over) in the population could be found in Poland (16.0 per cent in 2016) than in Ireland (13.2 per cent in 2016).

In Poland, unemployment benefits had a very small contribution to household disposable income. The share of this component varied between 1.9 per cent in 2006 and 0.6 per cent in 2016, while the unemployment rate fell from 13.8 per cent to 6.2 per cent. In Ireland in 2006, unemployment benefits accounted for 2.8 per cent of household disposable income. Ireland's economy entered a recession in 2008, and by 2010 the unemployment rate soared to 14.5 per cent. This contributed to an increase in the share of unemployment benefits in disposable household income to 7.8 per cent. Drops in employment drove these income declines, which would have been much greater were it not for the role of tax policies and in-cash transfer policies. Both the unemployment rate and the share of unemployment benefits decreased between 2010 and 2016. For the latest observed period, however, the share of unemployment benefits was at a higher level than in the pre-crisis period. Differences were also revealed when the respective shares of unemployment benefits were compared. In Ireland, the share of unemployment benefits in total social protection expenditures was three time higher than in Poland. The share of sickness and disability benefits was small compared to the market income in both countries.

Finally, we studied the composition of income resulting from family type. In Ireland, family and children-related allowances were another major source of income from social transfers, while the share of these transfers was much smaller in Poland. There were some notable differences between Poland and Ireland. The first concerns the demographic phenomenon: in Ireland, there was a higher fertility rate and a higher share of children than in Poland. The share of children (ages 0-14) was 22 per cent in Ireland and 14 per cent in Poland (World Bank, 2019). The second is connected with more targeted family and children's policies, which aimed at improving the material situation of Irish families.

4.2 Factor Inequality Decompositions

This section reports the results of the inequality decomposition analysis by factor components as suggested by Lerman and Yitzhaki (1985). We examined how different income sources affected the level of inequality in total disposable income. Table 4 reports the results of the decomposition of the Gini coefficient for Poland and Ireland in 2006, 2010 and 2016. Column 1 of Table 4 contains the sources of total disposable income used in the analysis. The shares of source k in total disposable income for Poland and Ireland are reported in Columns 3 and 6 of Table 4, respectively. Columns 4 and 7 report the values of the Gini coefficient for each component and for the total disposable income, while Columns 5 and 8 of the table present the relative contribution of each component to the total inequality (c_k). We compared the shares of various components of inequality with their shares of total disposable income (s_k) to reveal which income components strengthened and which smoothed inequality.

The decomposition of the Gini coefficient by income source allowed us to calculate the impact that a marginal change in a particular income source would have on inequality in total disposable income. Figure 2 summarises the results of the estimation of the marginal effects that every income source had on inequality by using the approach proposed by Lerman and Yitzhaki (1985).

In both countries, the total income inequality decreased slightly between 2006 and 2016 when measured using the Gini coefficient (Table 4). Throughout our analysis, we found that in both countries, household disposable income inequality was lower than earnings inequality, which in turn was much lower than inequality in the other components. In the case of Poland, the values of the Gini coefficient reflected a decline in earnings inequality between 2006 and 2016. Initially, earnings inequality in Ireland was lower than in Poland, but by 2010 the Gini coefficient soared to 62.3. Then a drop in earnings inequality was recorded, and the Gini coefficient equalled 58.5 in 2016. Many studies have suggested that increasing earnings inequality has been a major source of rising household income inequality. However, in Ireland in 2010, an increase in earnings inequality did not lead to an increase in total household disposable income inequality, presumably because of policy changes (e.g. the introduction of the new USC tax in response to the crisis).

After investigating earnings inequality, we turned to the contribution of this income source to total inequality. As expected, earnings were by far the most important contributor to total inequality in both countries. In both Poland and Ireland, the relative contribution of earnings to total inequality increased during the period considered. This trend was witnessed most notably in Ireland, where the relative contribution of earnings to total inequality rose to 131.6 per cent from 105.5 per cent, while in Poland the contribution of earnings increased slightly over time (from 108.2 per cent to 111.2 per cent). Furthermore, in Ireland in 2010, there was a significant increase in the relative contribution of earnings to total inequality compared to 2006 (from 105.5 per cent to 120.8 per cent), while the share of total

Table 4: Gini Coefficient Decomposition Results for Poland and Ireland [%]

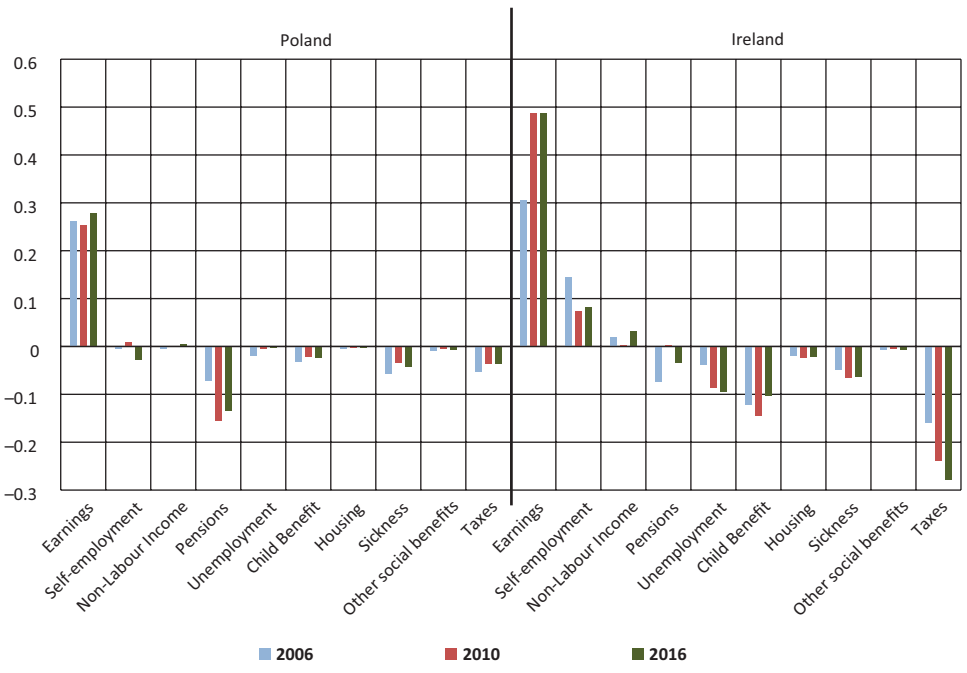
Income Source	*Year*	*Poland*			*Ireland*		
		s_k	*Gini*	c_k	s_k	*Gini*	c_k
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Earnings	2006	81.9	58.8	108.2	74.8	55.5	105.4
	2010	82.5	54.0	109.3	72.2	62.3	120.8
	2016	83.3	52.2	111.2	82.7	58.5	131.6
Self-employment	2006	14.0	89.7	13.5	18.8	89.8	33.2
	2010	15.1	87.5	14.9	12.1	92.4	19.6
	2016	12.9	87.1	10.0	11.2	91.6	19.4
Non-labour income	2006	2.2	94.5	1.6	3.3	90.8	5.2
	2010	2.1	94.6	2.3	2.1	92.7	2.5
	2016	1.8	95.6	2.4	3.0	94.9	6.3
Pensions	2006	25.8	75.4	18.5	9.6	86.9	2.1
	2010	23.5	74.2	11.0	13.6	88.2	13.7
	2016	24.6	73.3	11.0	13.4	86.8	10.0
Unemployment	2006	1.9	95.2	–0.1	2.8	91.7	–1.0
	2010	0.8	96.2	–0.1	7.8	82.2	–0.8
	2016	0.6	97.7	0.0	5.4	84.1	–4.2
Child benefits	2006	1.9	84.3	–1.4	7.1	63.4	–5.2
	2010	1.7	87.8	–1.3	8.9	66.1	–5.6
	2016	1.9	90.6	–0.5	6.9	65.0	–3.5
Housing	2006	0.3	96.3	–0.4	0.9	90.1	–1.0
	2010	0.1	98.0	–0.2	1.2	86.6	–1.1
	2016	0.1	98.5	–0.2	0.9	81.8	–1.1
Sickness	2006	4.5	88.8	–1.2	2.7	90.3	–2.2
	2010	3.1	90.1	–1.5	4.0	88.7	–2.7
	2016	2.7	91.4	–1.6	3.3	89.3	–3.1
Other social benefits	2006	0.5	96.3	–0.4	0.4	96.4	–0.3
	2010	0.3	96.9	0.4	0.7	96.2	0.1
	2016	0.3	97.7	–0.3	0.6	95.6	–0.1
Taxes	2006	–32.9	46.7	–38.3	–20.4	67.1	–36.3
	2010	–29.2	42.1	–34.1	–22.6	73.3	–46.6
	2016	–28.3	40.1	–32.0	–27.5	68.5	–55.2
Total	2006	100.0	33.3	100.0	100.0	31.9	100.0
	2010	100.0	31.1	100.0	100.0	30.5	100.0
	2016	100.0	29.8	100.0	100.0	29.5	100.0

Source: Authors' calculations using EU-SILC data.

disposable income coming from earnings decreased from 74.8 per cent to 72.2 per cent. The increase in the relative contribution of earnings starting in 2010 was mainly due to greater dispersion and inequality of earnings. In other words, in Ireland in 2010, the relative contribution of earnings to total inequality was disproportionately high compared to the share of this source in total disposable income.

In both countries, earnings were an increasing source of inequality. Furthermore, earnings were a disequalising component, with a higher marginal effect in Ireland (see Figure 2). Satya (2004, p. 436) mentioned that the decomposition analysis is an ex-post accounting exercise in that it tells us the relative contribution of each income component to overall inequality. This is useful information in planning social and fiscal policies. However, the government can influence income from a specific source only at the margin by increasing or decreasing tax rates. Therefore, it is more important to know how the marginal changes in each income source affected the level of inequality. In Poland, the marginal effect of earnings was at a relatively constant level (between 0.263 and 0.279), while in Ireland it increased from 0.306 in 2006 to 0.487 in 2010 and 0.488 in 2016.

Figure 2: The Marginal Effects of Income Components from the Gini Decomposition



Source: Authors' calculation using EU-SILC data.

Although earnings were the largest component of household disposable income in both countries, income from self-employment and residual categories of market income also played a significant role. The Gini coefficient indicated that self-employment income inequality was higher in Ireland than in Poland. In both countries, the role of self-employment income fluctuated over the study period. The contribution of self-employment income to total income inequality increased in Poland in 2010 and then decreased significantly in 2016. In Ireland, the highest relative contribution of self-employment income to total inequality was observed in 2006. The Gini coefficient of decomposition indicated that the relative contribution of this source to total inequality was disproportionately high (33.2 per cent), while the share of total disposable income coming from self-employment was 18.8 per cent (Table 4). The strong dispersion in self-employment income accounted for the increases in the relative contribution of this source to total inequality. This dispersion likely also accounted for its significant contribution to overall income inequality. In Ireland, self-employment income was the second most important factor contributing to income inequality. Furthermore, self-employment income played a much more important role in Ireland than in Poland, which is not surprising considering the differences in welfare state regimes and more incentives for the self-employed in the liberal system. In Poland, contrary to Ireland, self-employment income was a rather equalising component of income (except for in the year 2010); however, its marginal effect was very small over the whole period. In Ireland, the marginal effect of self-employment income on inequality was positive during the study period, and its highest value (0.15) was noted in 2006 (Figure 2). In this country, self-employment income, as well as earnings, contributed to higher inequality in household disposable income.

When examining Figure 2 more closely, it is evident that the marginal effect of the other market income components, apart from earnings and self-employment income, tended to be smaller. Although the marginal effect of the residual categories of market income on inequality was negative during the first two time-points of the study in Poland, in 2016 it was positive. In contrast, in Ireland the marginal effect of this income source was disequalising throughout the entire examined period. It is worth noting that in both countries it was disproportionately lower compared to the marginal effect of earnings.

The study of the role of social transfers in shaping income inequality was initiated by analysing old age and survivor's benefits. In both Poland and Ireland, inequality in old age and survivor's benefits remained relatively stable over time, and inequality was smaller in Poland than in Ireland. As a result, although neither country experienced an increase in inequality in old age and survivor's benefits, the contribution of this source of income to overall inequality changed significantly in 2010. In addition, the decomposition of the Gini coefficient indicates that in Poland the contribution decreased significantly, while in Ireland it increased significantly. Old age and survivor's benefits contributed positively to the inequality

of disposable household income in both countries (Table 4, Columns 5 and 8). As shown in Figure 2, in Poland, the marginal effect of old age and survivor's benefits on inequality was negative and significant during the studied period, and its highest value was noted in 2010 (-0.156).

We turn next to unemployment benefits, which accounted for a higher proportion of Irish household income than Polish household income. The challenge was to tackle unemployment by providing economic opportunities to the poor and disadvantaged in order to reconfigure the distribution of market income. The Gini coefficient showed that changes in inequality in unemployment income between 2006 and 2016 were of small magnitude in both countries. However, the dispersion of this income component was much higher in Poland than in Ireland. Unemployment benefits generated negative contributions in both countries, and the inequality-reducing effect was stronger in Ireland than in Poland (Table 4, Columns 5 and 8). In Poland, the relative contributions of this source to total inequality fluctuated around –0.1 per cent. In Ireland, unemployment benefits reduced income inequality by 0.8-4.2 per cent. Interestingly, the inequality-reducing effect was not the highest in 2010, when the share of unemployment benefits in total disposable income was the highest during the period considered, but in 2016. The marginal effect of these transfers was equalising in both countries, and its magnitude was most significant in Ireland (Figure 2).

The results for family and children-related allowances showed that this component represented a higher proportion of total disposable income in Ireland compared to Poland. The higher inequality of this component was observed in Poland. Additionally, we observed an increase in the Gini coefficient for family and children-related allowances (from 84.3 to 90.6) in Poland over the study period. The values of the Gini coefficient for Ireland remained more stable (between 63.4 and 66.1). The use of decomposition methods enabled us to explore completely different systems with varying levels of development and diverse social policies. Family and children-related allowances contributed negatively to the inequality of household disposable income in both countries. An inequality-reducing effect caused by family and children-related allowances was much lower in Poland than in Ireland. The relative contribution of family and children-related allowances was much higher throughout the period in Ireland than in Poland. In Ireland, this social transfer proved to be the most smoothing type of income. This result explains the differences that occurred between Poland and Ireland in fertility rates and the share of women participating in the labour market, which are the result of more effective family policy in Ireland. Thus, the marginal effect of family and children-related allowances was equalising in both countries, and its magnitude was most significant in Ireland, as was the case with unemployment benefits (Figure 2).

The last components of social transfers with significant shares were sickness and disability benefits. The Gini coefficient varied from 88.8 to 91.4 in Poland and from 90.3 to 89.3 in Ireland. Sickness and disability benefits had an inequality-

reducing effect in both countries, representing the fundamental role of redistributive policy – the protection of the sick and infirm.

In both countries, social transfers, taxes and social insurance contributions played a role in the reduction of inequality. The marginal effect of old age and survivor's benefits, unemployment benefits, family and children-related allowances, housing allowances, sickness and disability benefits and the residual category of social transfers was equalising, but the magnitude of their effects evolved differently. In Ireland, the marginal effect of unemployment benefits, family and children-related allowances, housing allowances, sickness and disability benefits was higher than in Poland (Figure 2).

Tax inequality was much higher in Ireland than in Poland. The Gini coefficient oscillated from 46.7 to 40.1 in Poland and from 67.1 to 73.3 in Ireland. As expected, taxes negatively contributed to income inequality, decreasing their level, irrespective of the country. However, this effect was different in each country. Considering the results of the decomposition, we noted a substantial increase in the reduction of inequality due to this component in Ireland. The inequality-reducing effect rose substantially in Ireland (from 36.3 per cent to 55.2 per cent) over the period considered. The impact of taxes on income inequality likely increased as a result of the automatic stabilisers and the introduction of USC, which may have had an important impact on social protection during the crisis. An increase in the relative value of the contribution of taxes accounted for a reduction in household disposable income inequality. A surprising feature is that Poland did not exhibit a more redistributive tax component. The decomposition of the Gini coefficient showed its contribution to overall inequality and oscillated between –38.3 per cent in 2006 and –32.0 per cent in 2016. Note that the relative contribution of taxes was much higher in Ireland than in Poland in 2010 and 2016, reflecting the higher effectiveness of the tax system in Ireland. The results of the study reveal important cross-country differences in the role of taxes in reducing inequality. The marginal effect of taxes was much higher in Ireland. The magnitude of their impact was considerably smaller in Poland (–0.05 in 2006 and –0.04 in 2016) than in Ireland (–0.16 and –0.28).

V CONCLUSIONS

The outcomes of the analysis show important differences between Ireland and Poland in the contribution of social transfers and taxes to overall household income inequality, even though disposable income inequalities were at comparable levels in 2016. By examining ten income components that contribute to inequality, we not only considered government tax and transfer policies, but also the importance of demographics and labour market factors. The different structures of population, with a higher share of children and lower share of elderly in Ireland, triggered

different policy changes. Redistribution policies played an important role in reducing inequality, but their results were quite different depending upon the kind of social protection programmes that had been put in place in both countries. On the basis of the conducted analysis, we verified the hypothesis that tax and social transfer systems played a more important role in tackling inequality in Ireland than in Poland.

The main findings were as follows. First, our analysis of the impact of each factor indicated that the same sources (earnings, self-employment and old age/survivor's benefits) contributed to increasing inequality in both countries. The decomposition results showed that labour inequalities contributed the most to household disposable income inequality. However, these contributions were significantly lower in Poland than in Ireland for the analysed period. Further, self-employment income played a much more important role in Ireland than in Poland. Moreover, even though the relative contribution of labour income inequality increased in Ireland, the disposable income inequality slightly decreased. In Poland, in contrast, the relatively lower labour incomes inequality affected disposable income inequality to a lesser extent and was one of the important reasons for the country's relatively low and decreasing disposable income inequality.

Secondly, family and child-related allowances, unemployment benefits, taxes and social insurance contributions had an inequality-reducing effect. The extent to which these components of income decreased inequalities differed between the countries. In Ireland, all the aforementioned components of social transfers and taxes contributed to a decrease in income inequalities to a greater extent.

Thirdly, in both countries, income taxes and social insurance contributions were by far the most important factor of income inequality reductions, while the contribution of benefits was negligible. It can be argued that many transfers have purposes other than income distribution. Whereas taxes and social insurance contributions are significantly correlated with income, transfers have a much less explicit effect on income distribution, but they do address other issues. This was illustrated by the nonsignificant correlation between social benefits and disposable income.

Fourth, the marginal effect of unemployment benefits, family and children-related allowances, housing allowances and sickness and disability benefits was higher in Ireland than in Poland. This also explains the higher effectiveness of these social transfers in reducing income inequality.

In conclusion, even though income inequality is mostly determined by labour market conditions, the effectiveness of redistribution policies also plays a very important role. This can be observed in the example of Poland, where relatively low and decreasing earnings inequality greatly affected the relatively lower income inequality. Additionally, other components of social transfers and taxes contributed to income inequality to a lesser extent than in Ireland. Therefore, the decrease in total income inequality in Poland was mainly explained by the labour market

situation, which resulted in increased equality in earnings. In contrast, even though labour income inequalities in Ireland increased to a greater extent, government policies on the labour market, tax policy and family policy effectively reduced total income inequality. The results of the analysis show that the shares of social transfers and taxes in household incomes are not the only factors that affect inequality. Ireland's redistribution policy was more targeted, and as a result, its higher income inequality decreased to a greater extent than in Poland through policies affecting the unemployed, families and taxes. Correspondingly, even though inequality in income before transfers was higher in Ireland, inequality after taxes and transfers was at a comparable level in both countries in 2016.

Although every effort was made, there are limitations to our analysis. Because we used EU-SILC data, we were unable to distinguish income taxes from social insurance contributions, and we could not account for in-kind transfers or indirect taxes. It should also be noted that the income data did not cover tax refunds from previous years. Moreover, recent inequality research has provided convincing evidence that survey data seem to be a less credible source of information about the levels of income than data derived from administrative sources (e.g. individual tax returns and aggregated income tax statistics; Brzeziński *et al.*, 2019). An important topic for future research is whether the Polish and Irish governments were efficient in their targeting of transfers and setting of tax rates as a means of countering the effects of the market on income inequality.

REFERENCES

Aksman, E., 2015. "To What Extent Do Social Benefits and Income Tax Alter Income Distribution in Poland?", *Ekonomia. Rynek, Gospodarka, Społeczeństwo*, Vol. 41, pp. 7-22.

Alves, N., 2012. "A View on Income Redistribution in Portugal and in the European Union", *Economic Bulletin,* Banco de Portugal, pp. 39-54.

Anioł, W., 2003. "Europeizacja Polskiej Polityki Społecznej", *Studia Europejskie*, Vol. 3, pp. 9-35.

Atkinson, A.B., 1996. "Seeking to Explain the Distribution of Income", in Hills, J. (Ed.), *New Inequalities: The Changing Distribution of Income and Wealth in the United Kingdom*, New York, Cambridge University Press, pp. 19-48.

Bargain, O., T. Callan, K. Doorley and C. Keane, 2017. "Changes in Income Distributions and the Role of Tax-Benefit Policy During the Great Recession: An International Perspective", *Fiscal Studies*, Vol. 38, No. 4, pp. 559-585.

Beblo M. and T. Knaus, 2001. "Measuring Income Inequality in Euroland", *Review of Income and Wealth*, Vol. 47, No. 3, pp. 301-320.

Brady, D., 2009. *Rich Democracies, Poor People: How Politics Explain Poverty*, New York, Oxford University Press.

Brzeziński, M., 2018. "Income Inequality and the Great Recession in Central and Eastern Europe", *Economic Systems,* Vol. 42, pp. 219-247.

Brzeziński, M., M. Myck and M. Najsztub, 2019. "Reevaluating Distributional Consequences of the Transition to Market Economy in Poland: New Results from Combined Household Survey and Tax Return Data", IZA Discussion Paper Series, No. 12734, Bonn, IZA-Institute of Labour Economics.

Callan, T., C. Keane, M. Eage and J.R. Walsh, 2013. "Distributional Impact of Tax. Welfare and Public Service Pay Policies: Budget 2014 and Budgets 2009-2014", *Quarterly Economic Commentary: Special Articles*.

Caminada K., K. Goudswaard, C. Wang and J. Wang, 2019. "Has the Redistributive Effect of Social Transfers and Taxes Changed over Time across Countries?", *International Social Security Review*, Vol. 72, No. 1, pp. 3-31.

Charles-Coll, J.A., 2011. "Understanding Income Inequality: Concept, Causes and Measurement", *International Journal of Economics and Management Sciences*, Vol. 1, no. 3, pp. 17-28.

Doerrenberg, P. and A. Peichl, 2012. "The Impact of Redistributive Policies on Inequality in OECD Countries", IZA Discussion Paper Series, No. 6505.

Dukelow F. and M.P. Murphy, 2016. "Welfare States: How They Change and Why", in Murphy, M.P. and F. Dukelow (Eds.), *The Irish Welfare State in the Twenty First Century*, Palgrave Macmillan, pp.13-35.

Esping-Andersen, G., 1990. *The Three Worlds of Welfare Capitalism*, TJ Press Ltd., Padstow.

Esping-Andersen, G. and J. Myles, 2007. "The Welfare State and Redistribution". Available at: https://www.researchgate.net/publication/255583959_The_Welfare_State_and_Redistribution.

Eurostat, 2019. *Eurostat Database*. Available at: https://ec.europa.eu/eurostat.

Fuest, C., J. Niehues and A. Peichl, 2010. "The Redistributive Effects of Tax Benefit Systems in the Enlarged EU", *Public Finance Review*, Vol. 38, No. 4, pp. 473-500.

Giammatteo, M., 2006. "Inequality in Transition Countries: The Contribution of Markets and Government Taxes and Transfers", LIS Working Paper Series, No. 443.

Graca-Gelert, P., 2018. "Income Inequality and Poverty in Poland in 2010-2016 with Particular Focus on Aspects of Urbanization", in Weresa, M.A. and A.M. Kowalski (Eds.), *Poland: Competitiveness Report 2018: The Role of Cities in Creating Competitive Advantages*, Warsaw: SGH Warsaw School of Economics, pp. 43-61.

Grewiński, M., 2017. "Polska Polityka Społeczna w Latach 1989-2016 – Sukcesy i Niepowodzenia", in Ciura, G. and B. Kłos (Eds.), *Polityka społeczna w Polsce: Studia Biura Analiz Sejmowych Kancelarii Sejmu*, Vol. 2(50), pp. 59-92.

Jenkins, S.P., A. Brandolini, J. Micklewright and B. Nolan (Eds.), 2013. *The Great Recession and the Distribution of Income*, Oxford, UK: Oxford University Press.

Kennedy, S., Y. Jin, D. Haugh and P. Lenain, 2016. "Taxes, Income and Economic Mobility in Ireland: New Evidence from Tax Records Data", *The Economic and Social Review,* Vol. 47, No. 1, pp. 109-153.

Lerman, R.I. and S. Yitzhaki, 1985. "Income Inequality Effects by Income Source: A New Approach and Applications to the United States", *The Review of Economics and Statistics,* Vol. 67, No. 1, pp. 151-156.

Lindbeck, A., 2008. "Prospects for the Welfare State", IFN Working Paper, No. 731.

Marx, I., B. Nolan and J. Olivera, 2015. "The Welfare State and Antipoverty Policy in Rich Countries", in Atkinson, A.B. and F. Bourguignon (Eds.), *Handbook of Income Distribution*, Vol. 2B, Ch. 23, Elsevier, pp. 2063-2139.

Milanovic, B., 1999. "Explaining the Increase in Inequality During the Transition", *Economics of Transition*, Vol. 7, No. 2, pp. 299-341.

Mitra, P. and R. Yemtsov, 2006. "Increasing Inequality in Transitional Economies: Is There More to Come?", World Bank Policy Working Paper, No. 4007.

Myck, M. and M. Najsztub, 2016. "Distributional Consequences of Tax and Benefit Policies in Poland: 2005-2014", CenEA Working Paper Series, No. WP02/16.

Nolan, B., T. Callan and B. Maître, 2013. "Country Case Study – Ireland", in Jenkins, S.P., A. Brandolini, J. Micklewright and B. Nolan (Eds.), *The Great Recession and the Distribution of Income*, Oxford, UK: Oxford University Press, pp. 134-156.

North, D.C., 1990. *Institutions, Institutional Change and Economic Performance*, Cambridge, UK: Cambridge University Press.

O'Donoghue, C., J. Loughrey and K. Morrissey, 2013. "Using the EU-SILC to Model the Impact of the Economic Crisis on Inequality", IZA Discussion Paper, No. 7242.

O'Donoghue, C., J. Loughrey and D.M. Sologon, 2018. "Decomposing the Drivers of Changes in Inequality During the Great Recession in Ireland Using the Fields Approach", *The Economic and Social Review*, Vol. 49, No. 2, pp. 173-200.

OECD, 2011. *Divided We Stand: Why Inequality Is Rising*, Paris, OECD Publishing.

Roed, K. and S. Strom, 2002. "Progressive Taxes and the Labour Market: Is the Trade-Off between Equality and Efficiency Inevitable?", *Journal of Economic Surveys*, Vol. 16, No. 1, pp. 77-110.

Rosser, J.B., M.V. Rosser and E. Ahmed, 2000. "Income Inequality and the Informal Economy in Transition Economies", *Journal of Comparative Economics*, Vol. 28, pp. 156-171.

Satya, P., 2004. "Income Sources Effects on Inequality", *Journal of Development Economics*, Vol. 73, pp. 435-451.

Savage, M., T. Callan, B. Nolan and B. Colgan, 2018. "The Great Recession, Austerity and Inequality: Lessons from Ireland", *Review of Income and Wealth,* Vol. 65, No 2, pp. 312-336.

Schwabish, J., T.M. Smeeding and L. Osberg, 2006. "Income Distribution and Social Expenditure: A Cross-National Perspective", in Papadimitriou Dimitri, B. (Ed.), *The Distributional Effects of Government Spending and Taxation* New York, Palgrave Macmillan, pp. 247-288.

Szczepaniak, M. and A. Szulc-Obłoza, 2020. "Labour Market Institutions and Income Inequalities in the Visegrad Group Countries", *Comparative Economic Research. Central and Eastern Europe*, Vol. 23, No. 3, pp.75-90.

Verbist, G. and F. Figari, 2014. "The Redistributive Effect and Progressivity of Taxes Revisited: An International Comparison across the European Union", EUROMOD Working Paper, No. EM6/14, Colchester: University of Essex, Institute for Social and Economic Research (ISER).

Wędrowska, E. and J. Muszyńska, 2019. "Decomposition of Income Inequality by Income Sources: Evidence from the Visegrad Group Countries", in Loster, T. and T. Pavelka (Eds.), *Proceeding of the 13th International Days of Statistics and Economics*, pp. 1660-1669.

World Bank, 2019. *World Bank Database*. Available at https://data.worldbank.org/.