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# LIS

## Working Paper Series

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### **Inequality, Poverty and Child Benefits: Evidence from a Natural Experiment**

Piotr R. Paradowski, Joanna Wolszczak-Derlacz, Eva Sierminska

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# INEQUALITY, POVERTY AND CHILD BENEFITS: EVIDENCE FROM A NATURAL EXPERIMENT

**Piotr R. Paradowski,\* Joanna Wolszczak-Derlacz\*\* & Eva Sierminska\*\*\***

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## Abstract

We assess the impact of a new policy action in the form of cash child benefit introduced in Poland in 2016 (the program Family 500 +) on inequality and poverty. The analysis is based on micro-level household data from the Luxembourg Income Study (LIS) and Statistics Poland. We examine the changes in various indicators of inequality and poverty (Gini index, subjective and relative poverty rates) and their decomposition. We find evidence that the program substantially reduces inequality and poverty. This is confirmed by difference-in-difference estimation, in which treated and non-treated households are compared before and after the program's introduction.

*JEL: I32, I38, G15*

*Keywords: inequality, poverty, child benefit*

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## 1. Introduction

A decent quality of life that includes education, health care, housing, and nutrition, requires economic resources in the form of income and wealth (Atkinson, 2019; OECD, 2013). In order to maintain a reasonably good quality of life, societies should aim for equality of opportunity, of resources, and of outcomes. Yet inequality and, closely related, poverty, are still critical issues that need to be addressed in contemporary economies. They have been approached from various angles, offering various solutions (Atkinson, 2015; Piketty, 2015).

Child poverty is of special concern here. A lack of material resources can have enduring consequences on various dimensions of children's lives (Smeeding and Thevenot, 2016; Moor et al., 2009). Low-income children have worse cognitive development outcomes, resulting in poorer educational performance and ultimately affecting the future of society (Cooper and Stewart, 2013). Accordingly, reducing child poverty, through income redistribution via taxes and social transfers is an important objective of policymakers. A common policy in many developed countries is social transfers in the form of child benefits (Van Mechelen and Bradshaw, 2013; Van Lancker et al., 2015; Morissens, 2018). These cash or quasi-cash benefits, support household incomes to maintain the well-being of children, above poverty level.<sup>1</sup>

However, the efficiency of child benefits in reducing poverty and inequality, proves to be somewhat mixed in rich countries (Barrientos and DeJong (2004), Barrientos and DeJong (2006), Lebihan, and Takongmo (2018)). Recently, Bárcena-Martín et al. (2017) analyzed the impact of social benefits in attenuating child deprivation in 27 European countries, concluding that after controlling for country-level determinants they have a statistically significant effect.

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<sup>1</sup> In addition, as Bradshaw notes, child benefits "have three possible outcomes: poverty reduction; fertility; and empowering mothers" (Bradshaw, p. 84, 2018).

Presumably owing to the comparatively low economic growth rates of the rich countries, none of these studies considers economic growth as a factor in poverty reduction.

In 2016, the Polish government introduced a universal child benefit (the Family 500+ program) for each second and subsequent child up to age 18 and a means-tested benefit for households with one child.<sup>2</sup> The present paper assesses the extent to which the program reduced inequality and poverty among families with children. First, we examine changes in summary income indicators and decompose these by effect, source, and demographic characteristics. We pay special attention to child poverty. Next, we evaluate the Family 500+ program in depth, employing historical and recent micro-data from the Polish Household Budget Surveys. Thanks to the availability of repeated pre- and post-intervention cross-sectional data, we assess the impact of the intervention. Finally, we examine the causal effect of the child benefit on poverty reduction by difference-in-difference estimation.

Our analysis addresses the gaps in the literature concerning the evaluation of policy actions. We identify several strengths of the article. First, the use of micro-level household data, which together with proper sampling weights allows for the estimates to be generalized to the entire population. Second, the article deals with inequality and poverty indices and their decomposition, which identifies different sources of income. Third, we apply the difference-in-difference approach, which is especially well suited for the analysis of program efficiency while controlling for household characteristics. Finally, we assess not only relative poverty but also subjective poverty, showing how both are affected by the program.

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<sup>2</sup> The Family 500+ program is described in detail in Appendix A.

Our findings indicate that family benefits significantly reduce income inequality and poverty rates for families with children. To the best of our knowledge, this is the first study to evaluate policy actions in such a complex manner.

The rest of the paper is organized as follows. The next section provides an overview of the literature on child poverty and the initial results of the Family 500+ program. Section 3 presents the data and variables. Section 4 discusses the methodology used in the paper, while Section 5 provides an empirical account divided into two parts: descriptive analysis of trends in poverty and inequality and their decomposition; and the difference-in-difference analysis. Section 6 concludes with a discussion of the findings and policy recommendations.

## **2. The literature**

### **2.1 Inequality, economic growth and poverty**

Child benefits are obviously not the only way to alleviate children's poverty. Parents' improved labor market outcomes (higher participation in the labor market, better pay) can also increase the economic well-being of children. Higher economic growth would imply more jobs and better labor market outcomes that help households with children escape poverty in the long run. Where economic growth is low or negative, however, we should not expect a substantial reduction in child poverty from this source.

Research on the developing world shows that economic growth practically always reduces poverty (Fields, 2001; Dollar and Kraay, 2002), so it is still valid to ask about its relative importance compared with income redistribution policies (e.g. transfer payments and investment in human capital). For instance, White and Anderson (2001) argue that redistribution has proven more important than growth for poverty reduction. Hanmer and Naschold (2000) show that we would need three times more growth to reduce poverty in countries with severe inequality than in

those with milder inequality. Ravallion (1997; 2007) also finds that great income inequality can slow growth and poverty reduction. The debate whether poverty reduction depends only on growth or on redistribution addresses the complex, fundamental relationship between inequality, poverty, and growth (Bourguignon, 2019; Angelsen and Wunder, 2006; Ravallion, 2016), and is relevant in particular in Poland, a country which has experienced high economic growth in recent years.

## **2.2 Child poverty in cross-country comparison**

Many policy analysts and researchers have focused on the issue of child poverty. Typical studies, are case studies (for example, Bosnia and Herzegovina were analyzed by Chzhen and Ferrone (2017), Germany by Corak et al. (2008), Norway by Havnes and Mogstad (2015), and Bangladesh by Roche (2013)), or comparative cross-country studies (Rainwater and Smeeding, 2003; Bárcena-Martín et al., 2017; Bradbury et al., 2019; Chen and Corak, 2008; Diris et al., 2017). These studies seek to determine the causes of child poverty, either by identifying labor market outcomes that alleviate poverty, or by focusing on the role of social transfers (either universal or means-tested). To date, the latter approach has been more prone to scrutiny in terms of cost-effectiveness (for a detailed review, see Havnes and Mogstad, 2015). Empirically, however, child poverty correlates very strongly with low wages (Bradbury and Jäntti, 1999). For example, Whiteford and Adema (2007) seek to determine how employment policies and government transfers affect child poverty in OECD countries. They single out countries with relatively low child poverty thanks to efficient tax and transfer systems, such as Belgium, Denmark, Finland, and Sweden. They also identify other countries that seek to reduce child poverty via redistribution but have inefficient tax systems: these are Italy, Japan, Mexico, Portugal, Spain, and Switzerland. Not surprisingly, countries with both low unemployment and

very substantial benefits for children have the lowest levels of child poverty, while the lack of redistribution combined with high unemployment results in substantial child poverty. Bradbury et al. (2019) looked at "real income growth for the most disadvantaged children," concluding that there has been an improvement in the well-being for children over the last two decades in most countries due to higher earned income and social transfers that alleviate child poverty and act as "automatic stabilizers during recessions" (p. 271). A study of 12 OECD economies by Chen and Corak (2008) find that policy changes that foster labor market participation and increased governmental transfers for children are the main factors in reducing child poverty. Yet, children compared to other groups receive lower social protection in terms of transfers, even though they are in higher poverty prevalence than adults (Evans et al. 2018). An important study by Rainwater and Smeeding (2003) demonstrated that the difference in the child poverty rate between the U.S. and other developed countries depends on social policies and not on household demographics (gender, age, household type, earning status). There is also a vast literature on the clear association between child poverty and single mothers (Tach and Eads 2015; Gornick and Jäntti 2012; Cancian and Reed 2009; Lichter et al. 2006; Härkönen 2018). For instance, Gornick and Jäntti (2012) conclude that the labor market position of single mothers is the main factor in child poverty.

Overall, the academic and policy debate has yet to settle which is the more substantial contributor to poverty reduction — labor earnings (and income tax rates) or social transfers. Very few studies have managed to exploit the kind of natural experiment used here to contribute to the literature. We hope to further the discussion on the basis of Poland's very recent "Family 500 +" program.



### **2.3 The “Family 500 +” program and the first empirical studies of its effects**

Family benefits can be classified as universal (unconditional) and non-universal. Universal benefits do not depend on the parents' status (employed, unemployed) or income. Universal child benefits in Poland have a brief history. From 2003 to 2012 households received a one-off payment of 1,000 zloty (PLN) for the birth of each child as a childcare allowance.<sup>3</sup> On January 1, 2013, this allowance ceased to be universal and became means-tested. On April 1, 2016, a universal child benefit was introduced, fulfilling the election promises of the ruling Law and Justice Party (Prawo i Sprawiedliwość). The Family 500 + program is a tax-exempt transfer of 500 PLN per month for the family's second and each subsequent child up to age 18. Low-income families (with net per capita income not higher than 800 PLN per month) also receive support for the first (or only) child and means testing of this benefit too was abrogated beginning July 1, 2019. For additional details about the program and eligibility, consult Appendix A.

While the government has touted the impact the Family 500 + program on the financial situation of families as an out-and-out success story, to date only a limited number of studies have sought to verify these assertions systematically. Myck (2016), Magda et al. (2018), and Premik (2017), for example, analyze the effect of the program on women's labor market participation. The first two find that the employment rates of mothers compared to non-mothers diminished after the introduction of the child benefit. Premik (2017), on the other hand, argues that the program had only a minor impact on labor supply, with a small encouragement effect on hours worked by treated mothers of children of school age.

Simulations of the program's impact on poverty have been run by Goraus and Inchauste (2016), Brzeziński and Najsztab (2017) and Szarfenberg (2017). All suggest that the impact on

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<sup>3</sup> The average PLN-EUR exchange rate in 2017 was 1 Euro=4.3 Zloty (NBP, 2020).

overall poverty and child and household poverty would be substantial, with the greatest impact for households at the lower end of the income distribution. Brzeziński and Najsztub (2017) also show that the program would reduce income inequality in Poland.

Finally, more recent work (Magda et al., 2019) concludes that the effect is smaller than estimated by the previous studies. Brzeziński and Najsztub (2017), for one, in a simulation using pre-reform data, expected a decline in overall poverty of 35-47% and in child poverty of 75-100%. Our study, in any case, is one of the first to test the direct impact of the program on child poverty rates.

### **3. Data and variables**

The data in our study comes from the Polish Household Budget Surveys (HBS) collected by the Central Statistical Office. Each month more than 3000 households are surveyed via CAPI; the samples rotate quarterly. The survey uses a monthly budget diary to record all household expenditures and monetary and non-monetary incomes. We use several waves of the HBS data that have been harmonized by the Luxembourg Income Study (LIS) team.<sup>4</sup> The authors harmonized three waves (2014, 2015, and 2017) following the LIS procedures, so as to obtain data comparable over time. In particular, for 2014, 2015, and 2017 income is annualized by multiplying the monthly amounts by the number of periods in the year. We conduct the decomposition analysis and calculate poverty and income inequality measures using the annualized data for the years 1995, 1999, 2004, 2010, 2013, 2014, 2015, 2016, and 2017. Assessing poverty and inequality measures with yearly data (instead of smoothing the monthly

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<sup>4</sup> The LIS is an international cross-national data center that harmonizes households' income and wealth survey data into a common template of variables that are comparable across datasets in terms of concepts and definitions. The LIS is known in particular for its income variables, which have been used by thousands of researchers in a range of disciplines since the 1980s for research related to income inequality and poverty. It comprises over 400 datasets dating back to the 1960s for over 50 countries. It can be accessed at <http://www.lisdatacenter.org>.

data) is a common practice not only among researchers but also for policymakers and statistical offices (e.g. Cowell (2011), OECD (2015), GUS (2017)). In the difference-in-difference estimation, in order to precisely identify the month in which the 500+ benefit (April 2016) is introduced, we use data on the month of the interview. For this purpose, we modified the LIS data for the years 2013 and 2016 by collapsing the original monthly income data using the month of the interview into quarterly income data.

We look at poverty from two different conceptual angles: (1) from a monetary perspective; and (2) from a subjective perspective. The former concept is simply income poverty, with two types of poverty lines, namely the relative and “anchored relative” poverty line (Atkinson, 2019). The relative poverty line is set each year according to the median household income. A household is considered poor if its income is less than 60% of median disposable income of the weighted sample of households. The “anchored relative” poverty line is a mix of relative and absolute poverty: the relative poverty line for a given year (in our case 2013) is set as the base, and the amount is adjusted for other years using Eurostat’s harmonized index of consumer prices (HICP). Our relative measure of poverty is used in all the analyses, but the “anchored relative” measure is required for the decomposition of poverty into growth and distribution factors.

In the calculation of income poverty and inequality, we use disposable household income (DHI) bottom-coded (at 1 percent of the mean) and top-coded (at then times the median), divided by the square root of the number of household members to account for economies of scale.

The concept of subjective poverty is defined in research as one’s perception of one’s own welfare, which is a valuable element not only for identifying the poor but also for policy design (Atkinson, 2019; Deaton, 2018; Allen, 2017). The assumption is that individuals themselves

know better whether they are poor or not, so the proposition is to ask survey respondents directly (Deaton, 2010; Atkinson (2019)).

When we measure subjective poverty we define a household to be “poor” if it meets the following three conditions: (1) their economic situation is “bad” or “rather bad” (the other possibilities are “very good,” “rather good,” “neither good or bad”) (2) it needs to watch the daily budget very carefully while spending money on basic needs and (3) it does not have enough money for daily basic needs. Our definition corresponds closely to the various definitions of subjective poverty used in the literature (Duvoux and Papuchon, 2019; Vos and Garner, 1991; Wang, H. et al., 2020). This measure complements our objective measure of relative poverty and is displayed for poverty rates over time and in the difference-in-difference analysis.

We employ the standard procedures of income classification by type for the decomposition of income and poverty, namely labor income, capital income, social transfers (including the family 500+ benefit), and private transfers — all components constitute disposable household income (DHI). In our estimation, we use the following sociodemographic characteristics of households: household composition; the number of earners; the number of children under age 18; the number of members 65 or older; population size of the locality of residence; the region of residence; age of head; gender of head; the highest level of education attained and job characteristics of head (see Table B1 in Appendix B for the descriptive statistics). Additionally, in Appendix B Table B2, we present the per capita monthly DHI by type of household. Not surprisingly, the highest income is reported for one-person households and couples without children, and there is an upward trend for all households over time. In the empirical part of the analysis, the results are weighted using either the number of children or the total number of

household members, permitting generalization of the results to the entire population or the population of children in Poland.

## 4. Methodology

### 4.1. Poverty and inequality

The measures used in the distributional analysis of inequality and poverty are vast. We utilize several of these different metrics. First, we use the Foster-Greer-Thorbeck (FGT) poverty indices (Foster et al., 1984), to assess the relative poverty rate over time by population subgroups and source of income.

$$FGT_{\alpha} = \frac{1}{N} \sum_{i=1}^H \left( \frac{z - y_i}{z} \right)^{\alpha} \quad (1)$$

where  $z$  is the poverty line,  $N$  is the number of people in the economy,  $H$  is the number of poor (those with incomes at or below  $z$ ),  $y_i$  is the income of individual  $i$  and  $\alpha$  is poverty aversion.

We use FGT poverty indices with poverty aversions  $\alpha=0$  (FGT(0)), which measures the headcount ratio;  $\alpha=1$  (FGT(1)), which is the poverty gap index; and  $\alpha=2$  (FGT(2)), which puts greater weight on the poverty of the poorest individuals and measures the severity of poverty.

In order to assess how poverty is affected by growth (changes in income) and distribution (changes in inequality), we decompose relative poverty into growth and distribution components, an idea initially proposed by Datt and Ravallion (1992), to get at the complex linkages between poverty, inequality, and growth.<sup>5</sup> According to Bourguignon (2004), “it is important to consider growth and income distribution *simultaneously* and to recognize that income distribution matters as much as growth for poverty reduction” (p.10). This decomposition assumes “distribution-neutral growth,” meaning that if the poor and non-poor experience the same rise in living

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<sup>5</sup> The procedure was later modified according to suggestions by Kolenikov and Shorrocks (2005) and Shorrocks (2013), who implements the Shapley value and the non-parametric method.

standards (i.e. an increase in income by the same proportion), then the decline in the poverty rate would be due entirely to economic growth (income distribution is unchanged). But if the growth benefited the poor more than the others, then the distribution of income would change (in this case, inequality would decrease), and we could conclude that the main driver of poverty reduction was distributional change rather than growth as such. This distributional change could be due to changes in living standards that are associated either with market earnings or with social transfers (e.g. child benefits). To assess whether or not the Family 500+ benefit reduced poverty, we decompose poverty into its growth and distribution components using total disposable household income.<sup>6</sup>

An extension of the above analysis is the Shapley decomposition by components of a welfare measure, as proposed and implemented in Stata by Azevedo et al. (2012a; 2012b). Using this method, we assess the contribution of each income subcomponent to the increase or decrease in the various measures of poverty: FGT(0), FGT(1), and FGT(2).

Similarly, to relative poverty, the subjective poverty rate is shown over time according to population subgroups and sources of income, but it cannot be decomposed into growth and redistribution, nor can the Shapley decomposition be applied.

Since poverty is closely linked to inequality, we analyze trends using the relative Gini coefficient, a standard measure of inequality, based on household disposable income. We also decompose income inequality by source, using the method of Lerman and Yitzhaki (1985) to determine which income source most affected the increase or decrease in inequality in Poland in 2013 and 2017. Gini decomposition (Lerman and Yitzhaki, 1985, p.152-153) is defined as

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<sup>6</sup> Decomposing poverty according to market income only, in which the redistributive effort of government is not reflected, with the poverty line calculated from disposable income or market income, does not change the conclusions of the next section. This decomposition is available from the authors on request.

$$G = \sum_{k=1}^K r_k g_k s_k \quad (2)$$

where:  $G$  is a total income,  $r_k$  is the correlation between income source  $k$  and total income,  $g_k$  is the relative Gini of component  $k$  and  $s_k$  is  $k$ 's share of total income. The marginal effect (the partial derivative of the overall Gini with respect to a percentage change ( $e$ ) in source ( $k$ ) relative to the overall Gini can be written as:

$$\frac{\partial G / \partial e_k}{G} = \frac{s_k g_k r_k}{G} - S_k \quad (3)$$

where  $e_k$  is the percentage change in income source  $k$ . By examining the marginal effects, we can judge whether increasing the social transfers for families with children decreases inequality in disposable income, which in turn should reduce poverty.

#### **4.2. Difference-in-difference estimation**

The new social security program introduced by the Polish government satisfies the conditions for a natural experiment: (1) the Family 500+ program went into effect around six months after its announcement; (2) two groups can be identified, a treatment group that received the benefit and an ineligible control group. These two groups allow us to compare average outcomes across households in the presence or absence of the policy and to establish putative causes of changes in child poverty. Having the month of interview for the year 2016, when the benefit was introduced, strengthens our difference-in-difference findings by eliminating potential disruptions due to other factors that could reduce poverty if the data were collected, say, once a year. Nevertheless, it might appear that there are some caveats in the setup of this natural experiment since the aim of the program was not only to reduce poverty but also to increase fertility. Here, however, we do not examine fertility (an issue for future research) but we do address the issue of poverty reduction in single-parent households.

Our pooled cross-sectional data allow us to evaluate the impact of the Family 500+ program on poverty. We employ the difference-in-difference estimator. This method is straightforward (see Angrist and Pischke, 2009, Blundell and Dias, 2009, Wooldridge 2008; Wooldridge 2019, Blundell and Dias, 2009) but compelling for establishing the causal relationships between variables often used for policy assessment (see Bettendorf et al., 2015, De Boer et al., 2015).

The hypothesis is that poverty will fall after the introduction of the child benefit program. We model our binary dependent variable (0=not poor; 1=poor) first, using the linear probability model (LPM), which is straightforward to interpret (Puhani, 2012) and produces reliable average effect estimates (Angrist & Pischke, 2009). Then to check the sensitivity of our results we also use the probit model.

Following Wooldridge (2012), our LPM is as follows:

$$y_{it} = \beta_0 + \beta_1 dB_{it} + \delta_0 d2_{it} + \delta_1 d2 \times dB_{it} + \alpha_{it} X_{it} + u_{it} \quad (4)$$

where:  $dB_i$  is an indicator variable equal to 1 for the treatment group (those eligible for the benefit) and 0 otherwise,  $d2$  is a dummy for time period, equal to 1 after the policy implementation and 0 otherwise, and  $d2 \times dB$  is the interaction term representing treatment group in the second period. The parameter  $\delta_1$  is the difference-in-difference estimator that captures the impact of the Family 500+ program on poverty. A negative and significant estimated interaction parameter indicates that the program did effectively reduce poverty. We include several specifications of this model to check the robustness of the results, including those with and without additional covariates ( $X_{it}$ ), as well as different temporal cut-offs.



The assumptions of the difference-in-difference approach (that of parallel trends and lack of compositional change) hold in our case.<sup>7</sup> The former assumes that in the absence of the Family 500+ program, average poverty trends would be the same for eligible and ineligible households. This is seen in Figure 4 from 1995 to the end of 2015 – poverty trends are parallel and in Figure 6. Before the treatment, treated and non-treated households trended similarly as regards both relative and subjective poverty. The assumption of no compositional change also holds, as the 500+ child benefit can be considered to be exogenous. It is a cash transfer paid to all eligible families, and it is highly unlikely to have had an impact on the fertility rate in the short period analyzed in this paper.<sup>8</sup>

## **5. Empirical analysis**

### **5.1 Trends and decomposition**

In this section, we set the stage by showing the trends in various measures of inequality and evaluating the distributional impact of the individual components on overall income inequality, with a focus on family benefits. Figure 1 displays trends in inequality using the Gini index, calculated for the total population and for market income and family benefits to account for the governmental redistribution. The distance between the lines represents the reduction in inequality from market income alone (upper line) to market income plus family benefits (middle line), and finally disposable income, factoring in all governmental redistribution via transfers and taxes. Until to 2016, the reduction in the Gini index due to family transfers alone was just over 2

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<sup>7</sup> There were no other significant changes in family policy that could affect only children under the age of 18 (and their parents) during this period.

<sup>8</sup> In a longer-term scenario, this benefit could have also an impact on female labor force participation. The recent study by Premik (2017) cited above, however, does not find any such affect shortly after the introduction of the 500+ benefit.

percentage points; from 2016 on, that reduction more than tripled. The substantial decline in the Gini index between 2015 and 2017 suggests that family benefits contributed to the reduction in inequality (We return to this below when we decompose the Gini index). Figure 2 presents the trends in relative and subjective poverty rates for children, the entire population and the elderly. Several points here are worth emphasizing: there is a sharp decline in poverty rates for children beginning in 2016, a smaller decline for the whole population, and an increased poverty for the elderly households.

[Figure 1 about here]

[Figure 2 about here]

This pattern also characterizes the subjective poverty indicator shown in the right panel, for years 2013-2017. Here, the overall child poverty plummets from 14% in 2015 to under 5% in 2017, very similar in percentage terms to the change in relative poverty. Subjective poverty rates are lower than relative rates for all groups, most likely because households must be classed as either poor or non-poor.

The most convincing graphic representation of the Family 500+ program's impact in reducing poverty is Figure 3 showing relative and subjective poverty by population sub-groups. Families with two or more children (single- and two-parent) experience a very sharp drop in poverty rates starting in 2016 for both measures (around 20 percentage points). This suggests a correlation between government transfers to families with two or more children and poverty rates, which we explore further in section 5.2. The effect is also discernable among families with one child, although it is smaller since for this group the benefit is means-tested.

[Figure 3 about here]

Finally, Figure 4 shows trends in poverty according to source of income (market or market plus family benefits) and by type of family (one child, two or more). Poverty rates measured by market income and market income and benefits move in the same direction until 2015. Beginning in 2016, poverty gauged by market income plus family benefits dropped (and especially sharply for households with more than one child), while poverty based on market income alone increased. Notably, the decrease in poverty was much sharper among families with two or more children than among those with only one child, presumably owing to the way the benefit is structured.

[Figure 4 about here]

Next, we want to see whether the movements in poverty are due to income growth or to a shift of households along the income distribution. Accordingly, we decompose the change in poverty into two components: changes in income growth and changes in income distribution. Table 1 shows the decomposition for different periods, to better capture the specific changes. For example, during the whole period of analysis (2013 – 2017) the overall decline in poverty was 11.04 percentage points, of which growth accounted for 6.18 p.p. and redistribution for 4.86 p.p. (according to FGT0), indicating that the increase in income had a stronger effect. This is true for other periods as well, except for the changes after the introduction of the policy (between 2016 and 2017). Here, the two factors have a broadly comparable impact. In other words, in 2016 to 2017, the decrease in inequality and the rise in average income had a more or less equal effect in reducing poverty. By contrast, in the pre-treatment period, mean income growth had a greater influence than changes in the distribution of income.<sup>9</sup> Moreover, the longer the period of

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<sup>9</sup> Another interesting perspective would be to compare the decomposition for the pre-treatment and post-treatment periods, the treated and non-treated households as defined later in the paper for the difference-in-difference estimator.

observation, the greater the reduction in any of the poverty indices represented by the FGT family of metrics. Thus, the evidence supports the thesis that not only welfare policies but also economic growth influence income inequality and poverty rates, if not necessarily in the same manner.

[Table 1 about here]

Figure 5 decomposes poverty by type of income: labor, capital, pension, universal child benefit (Kids 500+), other social security transfers, and private transfers for the subsample of households with children under 18.<sup>10</sup> During 2013 to 2017, the largest factor in poverty reduction is the Family 500+ benefit; and its importance is more pronounced for more severe poverty (FGT2) – the deeper the poverty, the stronger the effect of this government transfer in reducing poverty.

[Figure 5 about here]

Table 2 shows the Gini decomposition for income components as proposed by Lerman and Yitzhaki (1985) for the years 2013 and 2017. Column (1) provides the share of each income source in total household disposable income. The share of family benefits in total income was more than five times larger in 2017 than in 2013, a substantial difference but one that was to be expected with the introduction of the 500+ benefit. Column (2) exhibits the inequality coefficient for each income source, and unsurprisingly inequality in family benefits decreased between 2013 and 2017 (from 0.898 to 0.733), given that the 500+ benefit is universal. The correlation between the Gini index calculated separately for each income source and for total income is shown in column (3). The negative correlation for family benefits in both years indicates that

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<sup>10</sup> The decomposition by income component and type for the whole population available from the authors on request.

these benefits went disproportionately to households at the lower end of the income distribution. And the higher correlation coefficient in 2013 than in 2017 confirms that in the former year family benefits were directed more toward low-income households. Column (4) shows the contribution of each income source  $k$  to income inequality, column (5) the percentage of this contribution, and column (6) the marginal effect of the income source  $k$  relative to the overall Gini index (a 1% change in income source  $k$ , other things equal, changes the Gini coefficient of total income by a certain percentage). Consistent with our previous findings above, labor and capital income increase the degree of income inequality (positive values in the elasticity and the percentage of contribution). Interestingly, labor income contributes a little more to the increase of the Gini index in 2017 than in 2013, suggesting that labor income has grown unequally over time. Family benefits, our focus here, have a small redistributive effect in 2013 and a substantially larger one (almost twice as large) in 2017.<sup>11</sup> The elasticities for family benefits in 2017, suggest that if the 500+ benefit increased by 1%, then income inequality would decrease by about 9.3%, whereas the equivalent decrease in 2013 would be only 2.3%.

[Table 2 about here]

## **5.2. Difference-in-Difference Analysis**

The decomposition of poverty and income inequality by source provides an indication of what factors contributed to changes in inequality and poverty. The analysis of trends in Figure 6 shows the year 2016 to be a turning point in the reduction of both subjective and relative poverty for families with two children or more. To check whether a causal relationship exists between the Family 500+ benefit and the decline in child poverty, we perform a difference-in-difference analysis, following eq. 6. Our outcome variable is binary (whether or not a household with

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<sup>11</sup> Similar conclusions emerge if we compare the years 2014 and 2015 with 2017.

children is poor, taking value 1 for poor households, 0 otherwise) and refers to relative and subjective poverty as defined earlier.

[Figure 6 about here]

The main estimations are carried out for households with children under age 18 in order to estimate the effect of the 500 + benefit. We estimate models for two different pre-treatment periods as noted in Table 3. The first – Period 1 is January 2013-March 2016; the second -- Period 2 is January 2013-October 2015. In Period 2, we exclude the period preceding the implementation of the policy (which had been promised in the election campaign), during which households could, theoretically, adjust their behavior in order to become eligible. The post-treatment always refers to April 2016–December 2017, since the policy was introduced in April 2016. The treatment group is defined as households with two or more children and eligible one-child families (those with per capita income less than 800 PLN). The results of our main specifications are shown in Table 3.

[Table 3 about here]

The first four columns report the results of difference-in-difference estimation for subjective and relative child poverty for Period 1 and Period 2 without any control variables. Columns (5) to (6) include a full set of covariates in the estimation. All the sociodemographic and labor market control variables have the expected signs: In order to enhance the clarity and readability of the difference-in-difference estimators in Table 3, we do not include the control variables in the table, yet they do have the expected signs (results are available upon request).<sup>12</sup>

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<sup>12</sup> We find that households with better educated heads, employed, with permanent jobs, working full time, without disabilities, and those that own their homes, have more earners, and are not located in villages or small towns, are less likely to be poor. Note that there exist some differences in the estimated control variables for subjective and relative poverty. Specifically, this relates to the various characteristics of household composition that are naturally an important

The most important is the coefficient of the interaction  $Period \times Treated$ . In all specifications, the average treatment effect is statistically significant and negative, indicating that the policy has had a significant effect on children's poverty. The results are robust to the inclusion of additional covariates in the two specifications. In column (5), the average treatment effect (DD) is -0.137, which means that the probability of being poor for households that get the 500+ benefit is 14 percentage points lower than for those that do not. This is confirmed in both Period 2 (column 6). For subjective poverty, the diff-in-diff estimators shown in columns (7) and (8) remain significant at about -10% for the two periods.

### 5.3 Sensitivity analysis

Next, we test the sensitivity of our main findings by using the probit, the same specification and examining various sub-samples. We compute the difference-in-difference estimator with a full set of covariates using probit, since LPM has some drawbacks, specifically in terms of the predicted probabilities of the independent variables because the dependent variable is binary (Wooldridge, 2012). Following Wooldridge (2012), we model probit with dependent variable being latent:  $y_{it} = 1[y_{it}^* > 0]$ , and the independent variables are analogous to eq. (4). After estimating probit models, we compute the average difference-in-difference using marginal effects. All the models in this section are estimated for relative and subjective poverty with LPM and probit for Period 1 and Period 2. They are run with a full set of covariates, but for purposes of illustration we only show the difference-in-difference estimators.

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determinant of poverty. Probably the most interesting difference is that single parents are more likely to describe themselves as poor than one-child households, while the estimate of relative (objective) poverty indicates that in fact single parents are better off than couples with one child. This issue is worth further investigation. The full results with all covariates are available from the authors on request.

Table 4 shows the probit marginal effects where all specifications for the treatment and non-treatment groups hold as for the LPM presented in Table 3. The difference-in-difference estimators are statistically significant and similar in magnitude, confirming the main findings of the baseline model.

[Table 4 about here]

Next, we estimate our models for two groups of households that are especially at risk of poverty, namely those with less education and single-parent households (Tables C1 and C2 in the Appendix). The magnitude of the effect increases substantially compared with the primary model presented in Table 3. Among low-educated households with children, the probability of relative poverty is 20 percentage points lower for those receiving the 500+ benefit than for the others. The same goes for subjective poverty, although the effect is about three percentage points smaller. These findings confirm the simulated results discussed in Section 2.2. Looking at the most vulnerable households (single parents), the effect remains statistically significant and in the range of 20 percentage points for subjective and 22 points for relative poverty (Table C2).

Second, we modify the treatment group by including all households with two or more children under 18 (control group: households with at most one child) (Table C3 in the Appendix). This specification assumes that the program is not to one-child households (as was the case initially). The results remain statistically significant, but the magnitude of the decrease in poverty is slightly smaller, which could be interpreted that if the program had been directed only to families with two or more children, the reduction in poverty would be less pronounced.

Finally, since the 500+ program might affect the labor market participation of household members, we estimate an additional specification of our model using the difference-in-difference-in-difference (DDD) estimator. The program might have had an influence on labor



market participation of one child families who before April 2016 had income barely above the cap for eligibility. To become eligible for the program, these people may have reduced their working hours in order to lower their income. Since the policy was not intended for them, this manipulation of income would bias the policy effect. To check this, we estimate a model in which program eligibility for one-child families is set by low education of the household head, instead of income. Thus, we include an additional interaction term in the form  $Period \times Treated \times Edu\_low$  to capture this. This measures the effect of the child benefit program on poverty in Table C4. The DDD estimator gives results practically identical to the baseline model in Table 3. For relative poverty, however, the effect is smaller than in the main specification, decreasing the poverty-reduction effect by an average of three percentage points.

In summary, the sensitivity analysis confirms the results from the primary model in Table 3, albeit with some small variations in magnitude depending on the specification used. The difference-in-difference estimators for subjective poverty are around 3 percentage points lower than for relative child poverty. We are inclined to conclude that the introduction of the child benefit was a significant factor in the decline in child poverty.

## **6 Conclusions**

We evaluate the impact of the Family 500+ program on poverty and inequality. The program was introduced in Poland in 2016 as an electoral promise to reduce inequality and increase fertility. We examine the impact on the former and leave the latter for future research. First, we examine trends in poverty and inequality and their decomposition by income component. The assessment of trends in subjective and relative poverty as well as in inequality for different population subgroups and types of income suggests a correlation between the reform and the

decrease in poverty in the last couple of years. The decomposition of poverty and the Gini index by component of welfare also suggest that the 500+ child benefits have played a significant role in poverty and inequality reduction. Finally, the difference-in-difference technique confirms the causal relationship between the benefit payments introduced in 2016 and the decrease in poverty. Our decomposition results show that following the introduction of the 500+ benefit, the reduction in poverty is attributable equally to changes in distribution and to income growth. We assess not only relative but also subjective poverty and find that both have been reduced by the program.

While this examination of child poverty before and after the introduction of 500+ benefit is definitely a contribution, we certainly cannot claim to have exhausted the topic. To further inspect the effect of the child benefit on poverty, the concepts of absolute and "anchored relative" poverty could be used, as proposed by Atkinson (2019). In terms of distributional analysis, further research could determine whether the 500+ transfer payment moved these households up into a higher income group or at least got them out of poverty – a straightforward way to measure income mobility at any given point in time with cross-sectional household data (Mahler et al. 2012). Finally, questions about the efficiency or cost-effectiveness of the program could be answered with household data, thanks to very recent work by Kakwani et al. (2020). A report by Magda et al. (2019) concludes with a most unfavorable judgment in this regard, emphasizing the high cost of the Family 500+ program. This could help policymakers decide whether targeting the poor alone or offering a universal benefit is less costly and more effective in reducing poverty in general and child poverty in particular.

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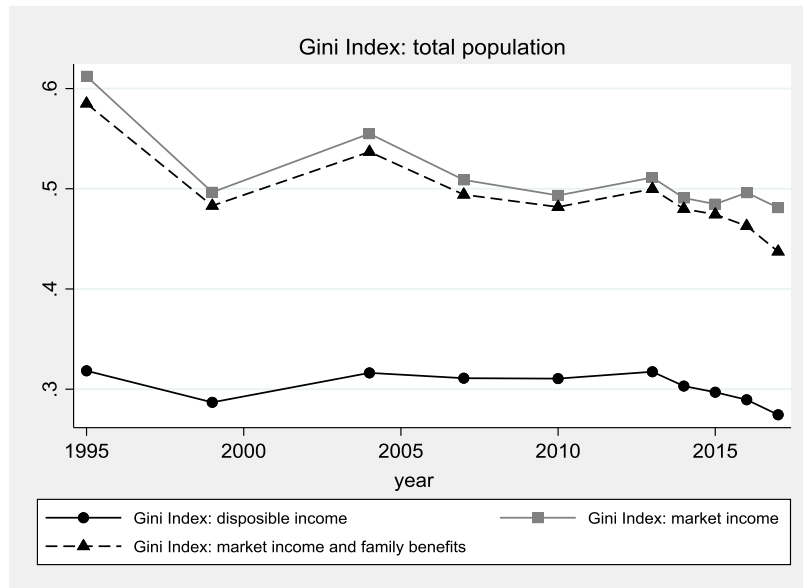
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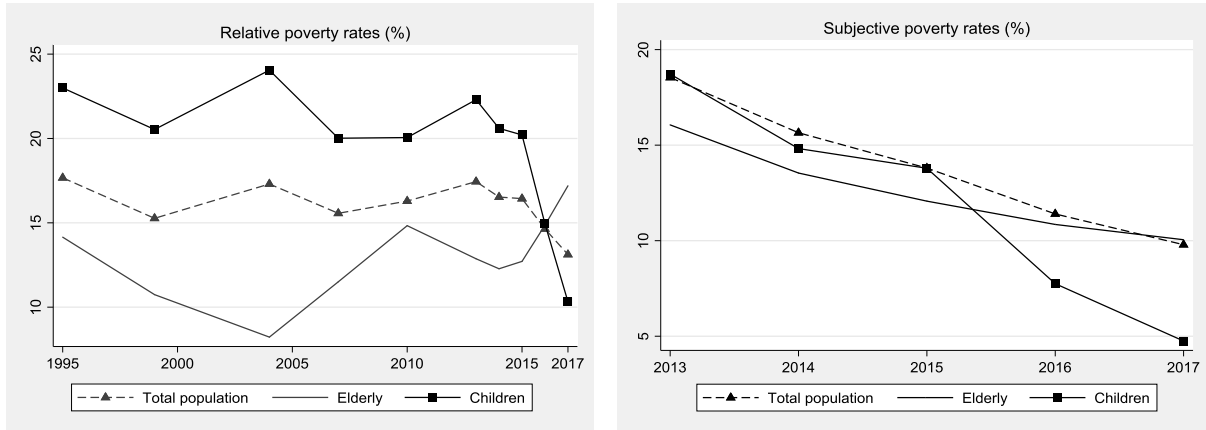
## Figures and Tables

Figure 1. Gini index over time



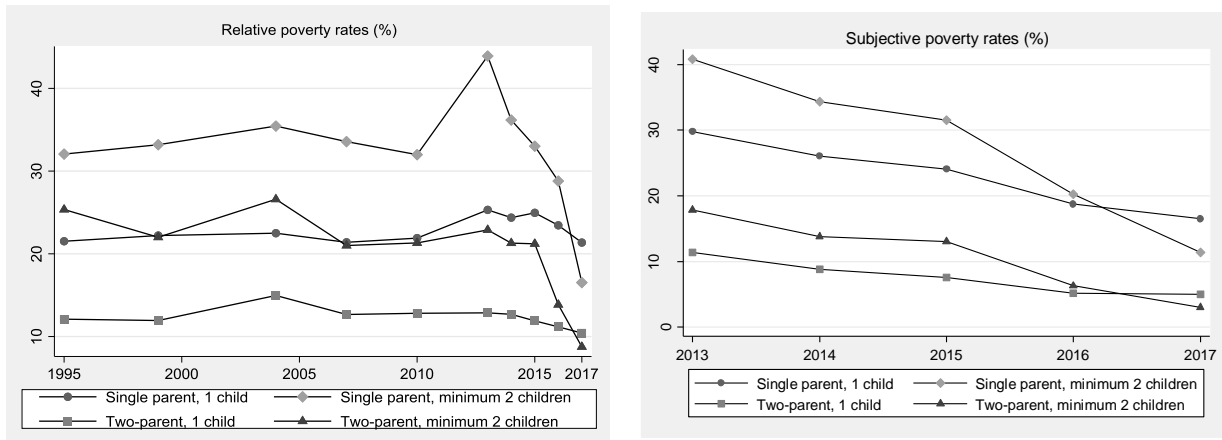
Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database.

**Figure 2. Relative and subjective poverty: population, children and elderly over time**



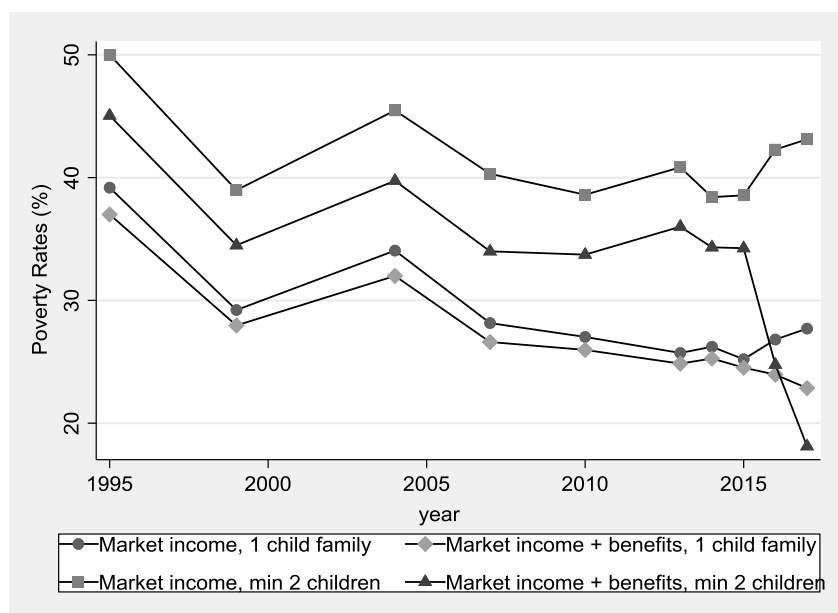
Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Figure 3. Relative and subjective poverty by population sub-groups**



Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Figure 4: Relative children poverty rates by population sub-groups and source of income**



Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

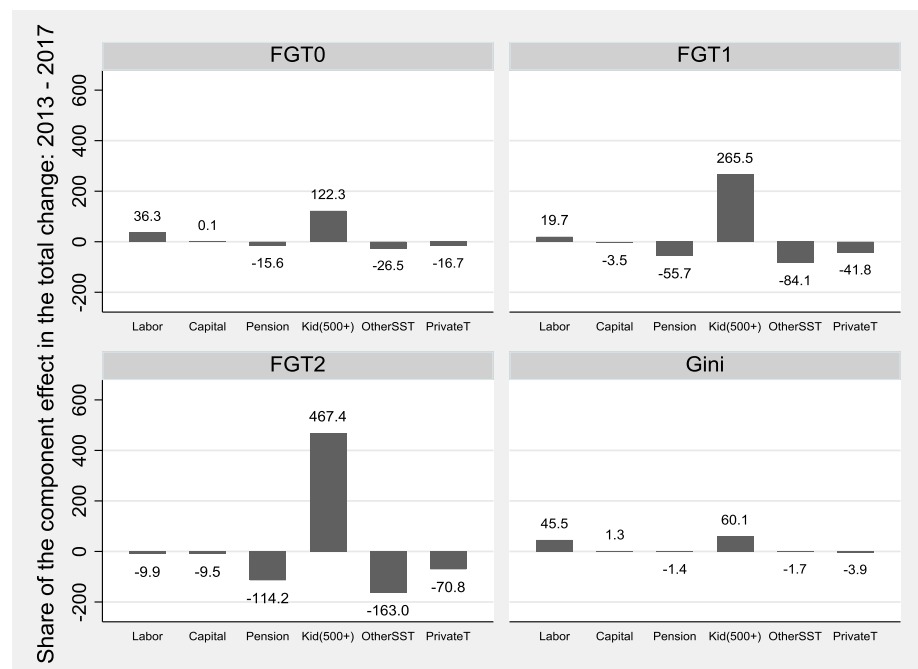
**Table 1. Relative Poverty decomposition into growth and redistribution based on disposable income (total population): 2013-2017, 2014-2017, 2015-2017 and 2016-2017**

Time period	FGT	Growth	Distribution	Total change in p.p
2013-2017	FGT0	-6.18	-4.86	-11.04
	FGT1	-1.51	-1.39	-2.91
	FGT2	-0.6	-0.6	-1.2
2014-2017	FGT0	-5.8	-3.69	-9.5
	FGT1	-1.41	-1.00	-2.41
	FGT2	-0.54	-0.41	-0.95
2015-2017	FGT0	-4.89	-3.44	-8.33
	FGT1	-1.19	-0.97	-2.15
	FGT2	-0.45	-0.44	-0.89
2016-2017	FGT0	-1.83	-2.11	-3.95
	FGT1	-0.43	-0.58	-1.01
	FGT2	-0.16	-0.26	-0.42

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

Note: FGT0 –headcount ratio; FGT1 – poverty gap index; FGT2 –poverty depth

**Figure 5. Decomposition by components of welfare measures: subsample of households with children less than 18 years old (2013-2017)**



Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

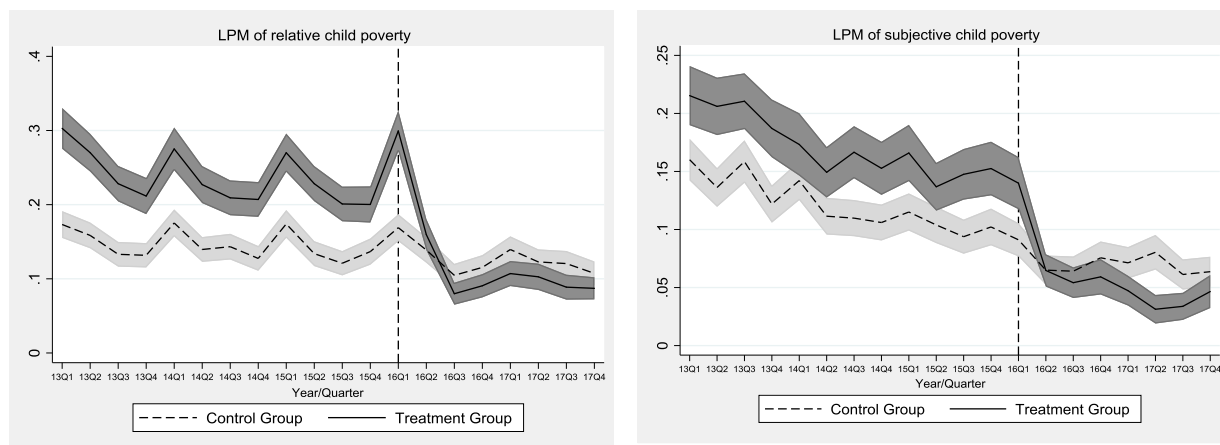
**Table 2: Gini index decomposition by source of income in 2013 and 2017**

Income source	Share s (1)	Coeff. g (2)	Corr. r (3)	Contri. s*g*r (4)	%Contri. s*g*r/G (5)	Elasticity (s*g*r/G)-s (6)
<b>2013</b>						
Labor	0.703	0.533	0.814	0.306	0.920	0.217
Capital	0.004	0.995	0.719	0.003	0.009	0.005
Pension	0.223	0.718	0.172	0.028	0.083	-0.140
Family benefits	0.012	0.898	-0.449	-0.005	-0.014	-0.026
Other social transfers	0.020	0.893	-0.242	-0.004	-0.013	-0.033
Private transfers	0.038	0.883	0.151	0.005	0.015	-0.023
<b>TOTAL</b>	<b>1.000</b>	<b>0.332</b>	<b>1.000</b>	<b>0.332</b>	<b>1.000</b>	<b>0.000</b>
<b>2017</b>						
Labor	0.674	0.499	0.822	0.276	0.978	0.304
Capital	0.003	0.995	0.693	0.002	0.008	0.004
Pension	0.204	0.719	0.041	0.006	0.021	-0.182
Family benefits (with 500+)	0.067	0.733	-0.148	-0.007	-0.026	-0.093
Other social transfers	0.019	0.916	-0.071	-0.001	-0.004	-0.023
Private transfers	0.034	0.872	0.230	0.201	0.007	-0.010
<b>TOTAL</b>	<b>1.000</b>	<b>0.282</b>	<b>1.000</b>	<b>0.282</b>	<b>1.000</b>	<b>0.000</b>

Notes: Decomposition based on Lerman and Yitzhaki's (1985) method

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Figure 6. Parallel trends with quarterly data (unsmoothed): relative (left panel) and subjective (right panel) poverty**



Notes: The Parallel trends are estimated by LPM with robust standard errors and sample weights and shown as linear predictions with the utilization of marginal effects.

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table 3. Linear Probability Models: Difference-in-Difference estimations**

	Difference-in-Difference Estimators without covariates				Difference-in-Difference Estimators with covariates			
	Relative poverty		Subjective Poverty		Relative poverty		Subjective poverty	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Period</i>	0.017*** [0.002]	0.018*** [0.002]	-0.013*** [0.003]	-0.014*** [0.003]	0.037*** [0.009]	0.004*** [0.005]	0.017** [0.008]	-0.051*** [0.005]
<i>Treated</i>	0.261*** [0.003]	0.259*** [0.004]	0.123*** [0.004]	0.127*** [0.004]	0.262*** [0.004]	0.258*** [0.004]	0.103*** [0.004]	0.107*** [0.005]
<i>Period</i> × <i>Treated</i>	-0.156*** [0.005]	-0.154*** [0.005]	-0.113*** [0.005]	-0.117*** [0.005]	-0.137*** [0.005]	-0.134*** [0.005]	-0.104*** [0.005]	-0.107*** [0.005]
<i>Other controls</i>	No	No	No	No	Full Set	Full Set	Full Set	Full Set
<i>R-squared</i>	0.074	0.073	0.039	0.041	0.236	0.230	0.176	0.175
<i>Observations</i>	62564	57327	62564	57327	62564	57327	62562	57325

Notes: regression with robust standard errors (in parentheses) with sample weights; \* $p \leq .10$ , \*\* $p \leq .05$ , \*\*\* $p \leq .01$ . Covariates include: (1) household head characteristics: sex, age, age-squared, education, permanent job, part-time job, disability; (2) household level characteristic: household type, socio-economic group, number of earners, number of household member older than 65, home ownership, locality size, region.

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table 4. Probit Models: Difference-in-Difference estimations**

	Difference-in-Difference Estimators with covariates			
	Relative poverty		Subjective poverty	
	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(3)	(4)
<i>Period</i>	-0.089*** [0.004]	-0.085*** [0.004]	-0.094** [0.003]	-0.097*** [0.003]
<i>Treated</i>	0.222*** [0.004]	0.215*** [0.004]	0.060*** [0.004]	0.059*** [0.003]
<i>Period</i> × <i>Treated</i>	-0.135*** [0.005]	-0.131*** [0.005]	-0.094*** [0.005]	-0.098*** [0.005]
<i>Other controls</i>	Full Set	Full Set	Full Set	Full Set
Pseudo R-squared	0.284	0.281	0.226	0.227
Observations	62562	57327	62562	57325

Notes: Probit marginal effects with robust standard errors (in parentheses) with sample weights; \* $p \leq .10$ , \*\* $p \leq .05$ , \*\*\* $p \leq .01$ .

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database



## Appendix A: The Family 500+ program

The program known as Family 500 + was introduced on 1 April 2016, pursuant to the State Aid in Raising Children Act [Act 1851 of 11 February 2016] The program is a tax-exempt benefit of 500 PLN a month for the second and every subsequent child up to age 18, regardless of household income. Low-income families (per capita monthly income of no more than 800 PLN net) receive support also for the first or only child. The program is the realization of pre-election promises of the Law and Justice Party (PiS).<sup>13</sup> According to the law (Article 4), the general objective is to cover the expenses related to bringing up children, including childcare and life needs.

The Ministry of Family, Labor, and Social Policy specifies three main aims: a) improvement in the Polish demographic situation; b) investment in human capital; c) reduction of poverty among children (MRPiPS, 2017).<sup>14</sup> The Ministry coordinates child support payments from communities. Application forms are submitted online or in person. The benefit is granted for one year, starting 1 October. Applications for the coming year can be submitted online or on paper at the local office from 1 July or 1 August. When a complete and correct application is received by 31 August, the first payment for the year is made by 31 October, maintaining continuity of payments from the previous year. For applications submitted in September, determination of entitlement and payment of the benefit for October and November is no later than 30 November. If the applicant delivers the application together with the required documents in the month of October, entitlement determination and payment of the benefit for October, November, and December is made by 31 December.

Applications relating to the second and subsequent children do not have to attach any additional documents confirming the income situation, because in this case the benefit is not means-tested. Applications for a first or only child must attach documents attesting to income, possibly consisting in:

- declarations of the applicant on amount of income not subject to personal income tax earned by household members,
- certificates from the tax office on activities under the provisions on flat-rate income tax on certain revenues of household members, registered lump-sum or tax card regarding the members receiving such income,
- declarations by the applicant of average farm size for household members who own a farm,
- other documents (including declarations) confirming the loss or receipt of income in the event of changes in the income situation.

All parents and guardians are eligible for the program, irrespective of income and marital status. Child support is not included in income in determining eligibility for benefits from other social

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<sup>13</sup> The PiS program of 2014 promises a new general child supplement, but excluding the highest-income families (Program Prawa i Sprawiedliwości, 2014, p.108)

<sup>14</sup> In the original PiS program the purpose of the “500+” was to counteract Poland’s low fertility rate.

programs (social welfare, alimony, family allowance, housing allowance, scholarships. There are no restrictions on how the child benefit is spent. However, the law does provide that where it is determined that the parents waste the benefit or do not spend it in accordance with the aims of the program, the authorities can transform it, wholly or in part, into direct payments for goods or services. Since 1 July 2019 the benefit goes to every child up to age 18 regardless of household income [Act of 26 April 2019, amending the Act on State Aid in Educating Children and some other acts (Journal of Law 2019, item 924)].

## Appendix B Descriptive statistics

**Table B1. Descriptive statistics of the sociodemographic characteristics of households and head of household**

Variable	mean	sd	min	max
<i>Household composition</i>				
Couple without children	0.249	0.433	0	1
Couple with one child	0.085	0.279	0	1
Couple with two children	0.097	0.296	0	1
Couple with three children	0.024	0.154	0	1
Couple with four children and more	0.007	0.084	0	1
Single parent	0.022	0.145	0	1
Couple with at least 1 child and relatives	0.070	0.256	0	1
Single parent and relatives	0.023	0.150	0	1
Relatives with children (usually grandparents raising kids)	0.010	0.097	0	1
One person household	0.205	0.404	0	1
Other type of household	0.159	0.366	0	1
Household with 18-24 years old children	0.049	0.216	0	1
<i>Number of household members 17 years old or younger</i>				
no members 17 or younger	0.662	0.473	0	1
1 member 17 or younger	0.170	0.376	0	1
2 member 17 or younger	0.127	0.333	0	1
3 member 17 or younger	0.031	0.173	0	1
4 member 17 or younger	0.007	0.083	0	1
5 member 17 or younger	0.002	0.044	0	1
6 member 17 or younger	0.001	0.026	0	1
7 member 17 or younger	0.000	0.014	0	1
8 member 17 or younger	0.000	0.007	0	1
9 member 17 or younger	0.000	0.006	0	1
10 member 17 or younger	0.000	0.004	0	1
11 member 17 or younger	0.000	0.003	0	1
<i>Locality size</i>				
Village	0.422	0.494	0	1

less than 20,000 inhabitants	0.112	0.315	0	1
20,000-99,000 inhabitants	0.173	0.379	0	1
100,000-199,000 inhabitants	0.076	0.266	0	1
200,000-499,000 inhabitants	0.088	0.284	0	1
More than 500,000 inhabitants	0.128	0.335	0	1
<i>Socio-economic characteristic of household</i>				
Farmers	0.046	0.210	0	1
Employee, laborer, blue-collar worker, manual worker	0.247	0.431	0	1
Employee, non-laborer, white-collar worker	0.239	0.426	0	1
Pensioners and retired	0.357	0.479	0	1
Dependents on social benefits	0.025	0.158	0	1
Making a living from other non-labour income	0.018	0.132	0	1
Self-employed	0.067	0.251	0	1
<i>Region of household location</i>				
central	0.218	0.413	0	1
south	0.201	0.401	0	1
east	0.170	0.376	0	1
north-west	0.152	0.359	0	1
south-west	0.106	0.308	0	1
north	0.153	0.360	0	1
<i>Number of earners in household</i>	1.119	0.978	0	8
<i>Households with 65 or older members</i>	0.329	0.470	0	1
<i>House owners</i>	0.812	0.391	0	1
<i>Head of household characteristic</i>				
Females	0.395	0.489	0	1
Age	52.090	16.461	16	105
<i>Education</i>				
Low education	0.143	0.350	0	1
Medium education	0.632	0.482	0	1
High education	0.225	0.418	0	1
Employed	0.623	0.485	0	1
Permanent job holder	0.480	0.500	0	1
Part time job	0.035	0.183	0	1
Disability	0.102	0.303	0	1
<hr/>				
No. Observations	185085			

Notes: Classification of education: low (ISCED 1 -2, and no education), medium (ISCED 3 and 4), high (ISCED 5 and higher).

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table B2 Per capita monthly household disposable income in PLN**

Household type	2013	2014	2015	2016	2017
Couple without children	1824.5	1848.8	1884.8	1941.4	2021.8
Couple with one child	1541.6	1534.3	1578.8	1636.3	1736.3
Couple with two children	1138.3	1196.9	1234.8	1342.2	1520.9
Couple with three children	871.2	870.9	925.0	1089.4	1235.1
Couple with four children and more	645.1	671.7	656.8	921.7	1027.2
Single parent	1097.3	1160.7	1173.7	1269.0	1368.9
Couple with at least 1 child and relatives living in household	954.5	968.8	1018.0	1191.6	1345.8
Single parent and relatives living in household	891.3	925.2	946.7	1054.2	1162.5
Relatives with children (usually grandparents raising kids)	854.3	855.1	929.2	1022.3	1168.5
One person household	1888.2	1945.2	2025.3	2053.2	2106.4
Other type of household	1359.3	1409.5	1447.1	1503.6	1611.2
Household with 18-24 years old children	1158.1	1218.4	1248.7	1321.9	1460.6

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

## Appendix C Additional estimations

**Table C1. Difference-in-Difference estimations; Sample restricted to low educated heads of households**

	Relative poverty				Subjective poverty			
	Linear Probability Model		Probit Model (Marginal Effects)		Linear Probability Model		Probit Model (Marginal Effects)	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Period</i>	-0.193*** [0.046]	-0.057** [0.028]	-0.326*** [0.033]	-0.208*** [0.018]	-0.074*** [0.019]	-0.078*** [0.019]	-0.204*** [0.015]	-0.213*** [0.016]
<i>Treated</i>	0.052*** [0.017]	0.044** [0.018]	-0.006 [0.014]	-0.016 [0.015]	0.043*** [0.017]	0.050*** [0.018]	-0.005 [0.014]	-0.005 [0.014]
<i>Period</i> × <i>Treated</i>	-0.209*** [0.029]	-0.201*** [0.030]	-0.178*** [0.028]	-0.195*** [0.030]	-0.173*** [0.027]	-0.178*** [0.027]	-0.160*** [0.027]	-0.166*** [0.027]
<i>Other controls</i>	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set
R-squared	0.208	0.200	0.173	0.167	0.190	0.194	0.176	0.180
Observations	4910	4528	4910	4528	4910	4528	4910	4528

Notes: regressions with robust standard errors (in parentheses) with sample weights; \*p ≤ .10, \*\*p ≤ .05, \*\*\*p ≤ .01.

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table C2. Difference-in-Difference estimations; Sample restricted to single parents**

	Relative poverty				Subjective poverty			
	Linear Probability Model		Probit Model (Marginal Effects)		Linear Probability Model		Probit Model (Marginal Effects)	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Period</i>	-0.064* [0.039]	-0.049* [0.025]	-0.178*** [0.033]	-0.102*** [0.018]	0.027 [0.045]	-0.137*** [0.026]	-0.194*** [0.016]	-0.204*** [0.016]
<i>Treated</i>	0.066*** [0.019]	0.058*** [0.020]	-0.015 [0.016]	-0.024 [0.017]	0.055*** [0.021]	0.063*** [0.022]	-0.022 [0.017]	-0.024 [0.018]
<i>Period</i> × <i>Treated</i>	-0.223*** [0.032]	-0.212*** [0.033]	-0.189*** [0.030]	-0.193*** [0.032]	-0.205*** [0.030]	-0.215*** [0.031]	-0.186*** [0.029]	-0.198*** [0.030]
<i>Other controls</i>	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set
R-squared	0.286	0.272	0.251	0.235	0.202	0.208	0.180	0.185
Observations	3984	3625	3984	3625	3984	3625	3984	3625

Notes: regressions with robust standard errors (in parentheses) with sample weights; \*p ≤ .10, \*\*p ≤ .05, \*\*\*p ≤ .01.

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table C3. Difference-in-Difference estimations: Treated group are households with two or more children**

	Relative poverty				Subjective poverty			
	Linear Probability Model		Probit Model (Marginal Effects)		Linear Probability Model		Probit Model (Marginal Effects)	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Period</i>	-0.064*** [0.010]	-0.022*** [0.006]	0.093*** [0.004]	-0.090*** [0.004]	-0.009 [0.008]	-0.080*** [0.005]	-0.094*** [0.003]	-0.097*** [0.003]
<i>Treated</i>	0.026*** [0.005]	0.023*** [0.005]	0.007* [0.004]	-0.012*** [0.004]	0.023*** [0.005]	0.023*** [0.005]	-0.003 [0.004]	-0.004 [0.004]
<i>Period</i> × <i>Treated</i>	-0.110*** [0.006]	-0.108*** [0.006]	-0.097*** [0.007]	-0.095*** [0.005]	-0.074*** [0.005]	-0.075*** [0.005]	-0.059*** [0.005]	-0.060*** [0.005]
<i>Other controls</i>	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set	Full Set
<i>R-squared</i>	0.207	0.2021	0.227	0.226	0.171	0.170	0.221	0.221
<i>Observations</i>	62562	57325	62562	57325	62562	57325	62562	57325

Notes: LPM and Probit marginal effect with robust standard errors (in parentheses) with sample weights; \*p ≤ .10, \*\*p ≤ .05, \*\*\*p ≤ .01.

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database

**Table C4. Difference-in-Difference-in-Difference estimations**

	Relative Poverty		Subjective Poverty	
	Period 1	Period 2	Period 1	Period 2
	(1)	(2)	(5)	(6)
<i>Period</i>	-0.062*** [0.010]	-0.019*** [0.006]	-0.008 [0.008]	-0.078*** [0.005]
<i>Treated</i>	0.025*** [0.005]	0.023*** [0.005]	0.020*** [0.005]	0.020*** [0.005]
<i>LowEduc</i>	0.176*** [0.012]	0.179*** [0.013]	0.117*** [0.012]	0.122*** [0.013]
<i>Period</i> × <i>LowEduc</i>	-0.043** [0.021]	-0.043** [0.021]	-0.029 [0.019]	-0.032 [0.020]
<i>Period</i> × <i>Treated</i>	-0.099*** [0.006]	-0.098*** [0.006]	-0.063*** [0.005]	-0.063*** [0.005]
<i>LowEduc</i> × <i>Treated</i>	0.003 [0.017]	-0.006 [0.018]	0.022 [0.017]	0.025 [0.018]
<i>Period</i> × <i>Treated</i> × <i>LowEduc</i>	-0.104*** [0.030]	-0.096*** [0.030]	-0.111*** [0.027]	-0.115*** [0.028]
<i>Other controls</i>	Full Set	Full Set	Full Set	Full Set
R-squared	0.210	0.205	0.173	0.173
Observations	62562	57325	62562	57325

Notes: regression with robust standard errors (in parentheses) with sample weights; \*p ≤ .10, \*\*p ≤ .05, \*\*\*p ≤ .01.

Period 1: pre-treatment period: January 2013-March 2016; post-treated period: April 2016-December 2017

Period 2.: pre-treatment period: January 2013-October 201; post-treated period: April 2016-December 2017

Source: Own elaboration based on data from Polish Household Budget Survey and Luxembourg Income Study (LIS) Database