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The effect of child benefit on female labor supply

Abstract

In 2016, the Polish government introduced a large child benefit, called "Family 500+", with the aim to increase fertility and reduce child poverty. It is universal for the second and every further child and means-tested for the first child. We study the impact of the new benefit on female labor supply, using Labor Force Survey data. Based on a difference-in-differences methodology, we find that the labor market participation rates of women with children decreased after the introduction of the benefit compared to that of childless women. The labor force participation rate of mothers showed a drop of 2–3 percentage points by mid-2017 as a result of the "Family 500+" program. The effect was higher among women with lower levels of education and among women living in small towns.

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List of abbreviations

EU European Union
GDP Gross Domestic Product
UCCB Universal Child Care Benefit

1 Introduction

In 2016, the Polish government introduced a large new child benefit, called "Family 500+", with the aim to increase fertility from a low level and reduce child poverty. Up until 2019, the monthly benefit – amounting to 500 PLN, a third of a net minimum wage - was universal for the second and every further child and means-tested for the first child.[a] This program more than doubled fiscal support for families, making Poland one of the top spenders in the European Union concerning cash transfers for families (3% of gross domestic product [GDP] in 2016). Other means-tested family benefits and tax breaks continue to exist, and the "Family 500+" transfer does not affect the eligibility for these or any other benefits, as it is not considered income for the purposes of establishing benefit eligibility.

This paper looks at the impact of the new benefit on female labor supply. The transfer increased out-of-work income significantly, especially for parents with several eligible children, reducing incentives to enter the labor market through an income effect. This held particularly for lower-earning families. Furthermore, in the first 3 years of its operation, the benefit for the first child was fully withdrawn once family income rose above the eligibility ceiling. This could create an inactivity trap for singles or second earners from low-earning families, as they would need to earn quite a high wage to make up for this loss.

From a theoretical perspective, in a simple static labor supply framework, child benefits may reduce labor supply through an income effect, as they shift the consumption–leisure budget constraint (Blundell, 1995; Moffitt, 2002; Cahuc et al., 2014). In a search model framework, the "Family 500+" child benefit is likely to increase the reservation wage and thus discourage labor market participation among individuals close to the income threshold below which the benefit for the first child was paid. Women, as primary caregivers, were likely to be particularly responsive to such incentives, which was confirmed by empirical evidence for other countries (Jaumotte, 2003; Milligan and Stabile, 2009; Haan and Wrohlich, 2011). Schirle (2015) analyzed the introduction of the Universal Child Care Benefit (UCCB) in Canada in 2006 and the impact it had on the labor market. Using Canadian Labor Force Survey data for 2003–2009, she found large and significant negative income effects of the UCCB on labor supply of mothers and fathers. The effects were stronger for less-educated parents, though affecting better educated women as well. Among mothers, labor supply was decreased at both the extensive and the intensive margins. González (2013) used a regression discontinuity framework to analyze the fertility and labor supply effects of a large universal one-time benefit introduced in 2007 in Spain. She found a negative labor force participation effect a year after birth, which however disappeared by the time the child was 2 years old.

The negative effects of child benefits on female labor supply tend to be greater for women with lower potential incomes and lower levels of education (Eissa and Liebman, 1996; Immervoll et al., 2007). Moreover, marital status is likely to play a role in the impact of child benefits

on female labor supply, with married women reacting more strongly to changes in income and wages. Koebel and Schirle (2016) followed up on Schirle's (2015) study of the Canadian UCCB, finding that the benefit decreased labor supply among married women but increased labor force participation of divorced/separated women, with no impact on mothers who had never been married or those in common-law relationships. Finally, the labor supply response to child benefits differs across countries, reflecting not only the institutional differences in the design of tax-benefit systems but also the level of economic development. In particular, Scharle (2007) finds the negative effect of cash benefits on female labor force participation to be higher in Central and Eastern European countries, which may be a reflection of lower income levels in these countries.

We contribute to the current knowledge on the effects of family benefits for the labor market in three ways. First, we study the labor market effects of such transfers in the context of a catching-up economy with relatively low social and family transfers hitherto. Second, the benefit is large relative to average incomes compared to child benefits in other countries. It amounts to around 16% of the average wage (in net terms), whereas, for instance, the size of the childcare benefit introduced in Canada in 2006 amounted to around 3% of the average monthly wage in Canada at that time. Thus, we expect a higher likelihood of observing a significant impact. Thirdly, the reform can be treated as a natural experiment. The 500+ benefit was introduced quickly after it was first announced as an element of the electoral campaign by a new government, so women are very unlikely to have anticipated the introduction by changing their labor supply or their decision to have children.

At the time of the implementation of the "Family 500+" program, Poland was distinguished by a very good labor market situation on the one hand, and low female labor market participation rates on the other. The latter is related to strong family values shaped by deep-rooted Catholicism and a relatively weak, although improving, institutional childcare infrastructure, in particular in rural areas.

Given this unique institutional framework, this study can add important insights into the nature of labor supply effects of child benefits. Our hypothesis is that the new child benefits may have reinforced a longer-standing trend of labor force participation among lower-skilled women in Poland to fall, while that among higher-skilled women increased at a slower pace. The fact that the benefit for the first child was withdrawn once the per capita family income increased beyond the eligibility ceiling limited the incentives for single mothers or second earners with children to work. An unemployed single mother of two taking up a job that pays the average wage would retain <20% of her earnings as a result of taxes and benefit withdrawal. Taking childcare costs into account, which can be very high in the private sector – often, the only available option – she would actually lose money.

We use Polish Labor Force Survey data for an ex-post evaluation of the reform. Before the program's implementation, Myck (2016) used a discrete-choice labor-supply model and Polish Household Budget Survey data to simulate the effects of the "Family 500+" benefit on labor supply. He found that the benefit could reduce labor supply in the long term by about 240,000 individuals. Based on a difference-in-differences methodology, we find that the labor market participation rates of women with children decreased significantly after the introduction of the benefit, compared to childless women, who were not eligible for the benefit. Results imply that the labor force participation rate of mothers would have been 2–3 percentage points higher in

the absence of the reform. The effect set in earlier for partnered women and, within this group, it was the highest among those with lower levels of educational attainment and thus, generally, with lower incomes.

2 Methodology and Data

We test the hypothesis that the implementation of the "Family 500+" program led to a fall in labor force participation among mothers. To this end, we use a difference-in-differences approach (Angrist and Pischke, 2014; Lechner, 2011). To identify the effect of the introduction of the "Family 500+" benefit, we compare changes in participation rates of (1) women who were eligible for the transfer, as they had children – our treated group, and (2) women who had no children and as such were not eligible – the control group.

In the case of women with one child, many were not eligible for the benefit, because their income was too high. Yet, single women could, in principle, become eligible by withdrawing from the labor market or reducing their hours worked so that their income dropped below the eligibility ceiling, as could some partnered women – provided their partner's income was low enough. It seems sensible to consider these women as treated, since the child benefit was potentially available to them and might thus influence their behavior. This is less clear for women whose partner's income was so high that they could not become eligible for the benefit even by withdrawing from the labor market. Assigning them to the treated group should bias the estimated impact on participation downward, as they cannot be reasonably expected to react to the benefit. This is why we also test some alternative specifications, which are discussed later.

We use Polish Labor Force Survey data for the years 2010–2017 (and from 2007 in the placebo test). We restrict the sample to women aged 20–49 years. The analyses are run separately for single and partnered women to account for differences in their labor force participation decisions, which are likely to be influenced by the presence of a partner. Partnered women are defined as women living with a spouse or cohabiting partner in the same household.

We compare the labor force participation rates before and after the second half of 2016, as municipal offices started transferring the "Family 500+" benefits as of the end of June 2016. We study the labor market reaction in the first year after the introduction of the benefit, i.e., until mid-2017. It is safe to assume that it was not anticipated and women did not react before they actually received the money – the benefit was announced in February 2016 and formally introduced in April 2016 when the first forms were made available to fill in (the municipal offices then had 3 months to disburse the benefit).

We estimate the following equation:

$$A_{it} = \alpha + \beta X_{it} + \gamma T_i + \delta Y_t + \theta Post_t \cdot T_i + \varepsilon_{it}, \quad (1)$$

where A_{it} is a dummy variable indicating whether individual i is active in the labor market in period t; α is a constant; X_{it} is a vector containing a set of individual-specific characteristics detailed in Table 1. Unfortunately, income and wage variables cannot be included as controls, as these data are unavailable (income) or too patchy (wages) in the Polish Labor Force Survey. T_i is a treatment group variable, specifying whether the woman has children (treated group) or not (control group); $Post_t$ is a dummy variable for the period following the second quarter of

Table 1 Descriptive statistics for women aged 20–49 years in 2016 (treated group – women with one or two children; control group – childless women)

Socioeconomic variables	Partnered women		Single women	
	Control (%)	Treated (%)	Control (%)	Treated (%)
Labor market status: employed	82	73	61	68
Labor market status: unemployed	4	4	8	7
Labor market status: inactive	14	23	31	25
Age: 20–29 years	24	18	61	23
Age: 30–39 years	20	51	20	45
Age: 40–49 years	56	31	19	32
Place of residence: city with >100,000 inhabitants	35	28	34	32
Place of residence: city with 20,000–100,000 inhabitants	19	19	16	21
Place of residence: city with <20,000 inhabitants	11	12	11	13
Place of residence: rural area	35	42	39	34
Educational level: tertiary	40	45	44	32
Educational level: secondary	34	34	40	40
Educational level: basic vocational or lower	26	21	16	29
Student status	5	2	26	3
Labor market status of partner: employed	89	93	–	–
Labor market status of partner: unemployed	3	3	–	–
Labor market status of partner: inactive	8	4	–	–
Educational level of partner: tertiary	26	30	–	–
Educational level of partner: secondary	34	35	–	–
Educational level of partner: basic vocational or lower	40	35	–	–

Source: Own calculations based on Polish Labor Force Survey data.

2016 when the child benefit was introduced, or the posttreatment period; ε_{it} is an error term; and α, β, γ, δ, and θ are parameters to be estimated. We also introduce time fixed effects to account for changes in labor market policies and the economic situation in general (Y_t is a set of half-year dummies).

We use the linear probability model to estimate Equation (1). We run the probit model as a robustness check, and the results were very similar (they are available upon request). To overcome error-term heteroskedasticity, we compute robust standard errors.

Table 1 compares the descriptive statistics for the treated and control groups in 2016, distinguishing between single and partnered women. Among the partnered women, those without children were much more likely to be employed (compared to women with children). The finding was opposite among single women, where those with children were more likely to be employed. Not surprisingly, childless women were much younger, in

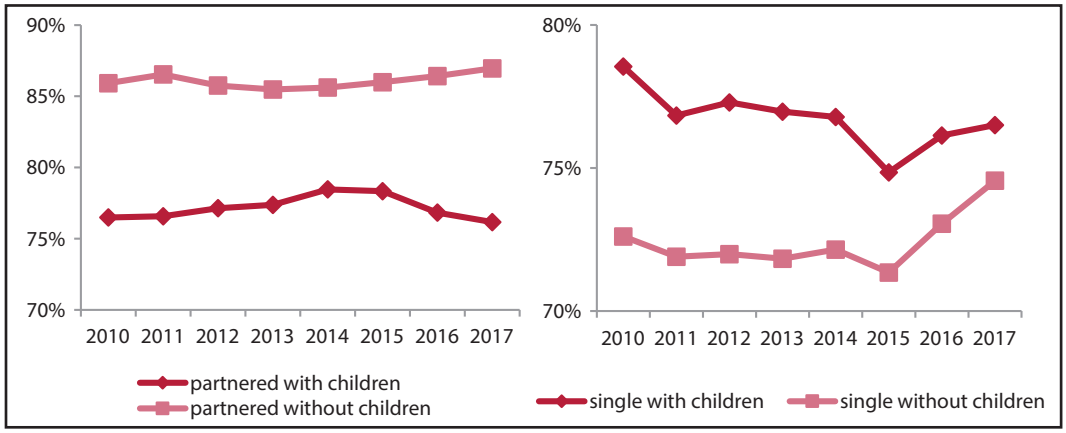
particular among singles. Childless single women were also already better educated and more likely to be still in education than single mothers. Among partnered women, there was a higher share of rural inhabitants in the treated group. This compositional difference may lead to different trends in labor participation between the two groups. To eliminate the impact of these compositional differences on labor force participation of women with and without children, we introduce the socioeconomic variables displayed in Table 1 as control variables in the estimated models.

2.1 Testing the common trends hypothesis

A key assumption of the difference-in-differences methodology is that – before the treatment – changes in the level of the outcome variable were the same in the treatment and control groups. We start with a visual inspection of historical trends of our outcome variable, labor force participation (see, e. g., Gebel and Voßemer, 2014; Centeno et al., 2009). Figure 1 shows that changes in participation rates for women with one or two children and those without children were indeed quite similar prior to the introduction of the child benefit in 2016, though these were not completely parallel.[b] These trends, however, reflect both (1) changing probabilities of participating in the labor market among women with and without children and (2) a changing composition of these two groups (e.g., rising shares of tertiary educated women), which also impact the labor force participation rates. The prereform trend of labor force participation rate of women with three and more children was quite different; therefore, we consider that childless women are not sufficiently similar to them for a valid comparison and drop women with three or more children from our analysis.

To further ensure that comparing the treated and the control groups permits identification of the effect of the child benefits, we test the common trends hypothesis more formally, using two approaches. Firstly, we include – in the model – the interactions of the treatment group variable not only with the posttreatment period (treatment effect) but also with all-time dummy variables (placebo effects) to test whether the difference in the treatment and the control groups has changed at any point in time. Insignificant interaction terms would indicate

Figure 1 Labor force participation rates of women aged 20–49 years with a partner (left) and without a partner (right) differentiated by the presence of children.



Note: 2017: only for the first half of the year.
Source: Own calculations based on Polish Labor Force Survey data.

that the difference between the two groups has remained stable and that the common trend hypothesis is valid.

Secondly, we vary the "Post" variable in Equation 1 so that it covers different periods, including 2009–2016, 2008–2015, 2007–2014 (i.e., the main specification moved backward by 1/2/3 years). If the coefficient of these interaction terms of the treatment group dummy with a subperiod dummy was significant, this would indicate that the difference between the treatment and the control groups has changed over time. In that case, the common trend hypothesis would not be valid.

Results for the main specification are presented in Table 2. Panel A is based on the main period of our analysis, i.e., 2010–2017, with the treatment occurring in 2016 (when the 500+ benefit was introduced) and with additional dummies for previous years. Panels B–D look at the pretreatment periods only, assuming a treatment in 2015, 2014, and 2013, respectively. All the placebo tests clearly show that there were no statistically significant effects prior to the introduction of the "Family 500+" policy. The results for other specifications also prove robust to the placebo dummies. These are available upon request.

Table 2 Placebo tests for main difference-in-differences specification

Socioeconomic variables	Partnered women	Single women
(A) Regression for 2010–2017 with all potential placebo/treatment effects		
Group effect (γ)	−0.055***	0.005
Placebo treatment effect (θ) - 2010/2011	−0.012*	−0.002
Placebo treatment effect (θ) – 2011/2012	−0.005	−0.004
Placebo treatment effect (θ) – 2012/2013	−0.000	0.002
Placebo treatment effect (θ) – 2013/2014	0.007	−0.003
Placebo treatment effect (θ) – 2014/2015	0.008	0.001
Placebo treatment effect (θ) – 2015/2016	−0.007	−0.014
Treatment effect (θ) – 2016/2017	−0.023***	−0.023*
Observations	300,792	174,872
R-squared	0.119	0.316
(B) Regression for 2009–2016 as in main specification		
Group effect (γ)	−0.051***	0.013**
Placebo treatment effect (θ) – 2015/2016	−0.007	−0.012
Observations	293,428	170,532
R-squared	0.120	0.310
(C) Regression for 2008–2015 as in main specification		
Group effect (γ)	−0.049***	0.011*
Placebo treatment effect (θ) – 2014/2015	0.007	0.008
Observations	282,988	165,472
R-squared	0.122	0.301
(D) Regression for 2007–2014 as in main specification		
Group effect (γ)	−0.045***	0.003
Placebo treatment effect (θ) – 2013/2014	0.005	0.012
Observations	269,835	158,947
R-squared	0.124	0.292

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.

3 Results and Discussion

3.1 The effect of child benefits on labor force participation

Table 3 reports the estimate of our main parameters of interest, γ, the group effect, and θ, the treatment effect. Estimates of other coefficients are presented in Table A1 in the Appendix. The estimates imply that, after adjusting for differences in the composition of the two groups, the labor force participation rate of childless women with a partner was almost 6 percentage points higher than for partnered women with one or two children over the estimation period. Following the introduction of the child benefits, this difference increased by 2.1 percentage points. The implication is that labor force participation among partnered mothers might have been 2.1 percentage points higher in the absence of the child benefits. The treatment effect for single women is of the same order.

To test whether the effect of the child benefit on female labor force participation changed over time, we also estimated Equation 1, allowing for a different treatment effect in 2016 and 2017. Results presented in Table 4 show that the negative effect of the benefit on labor force participation actually strengthened in 2017 for both partnered and single women. For single women, it was insignificant in the first posttreatment period and a little higher than for partnered women in the second period.

Table 3 The effect of child benefits on labor force participation of mothers, for women aged 20–49 years with one or two children

Socioeconomic variables	Partnered women	Single women
Group effect (γ)	−0.057***	0.002
Treatment effect (θ)	**−0.021*** **	**−0.020*** **
Observations	300,792	174,872
R-squared	0.119	0.316

The coefficients of partnered women and single women have significance levels of 0.000, and 0.008 respectively.

Note: The coefficients of all covariates are provided in Table A1 in the Appendix. Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.

Source: Own calculations based on Polish Labor Force Survey data.

Table 4 The dynamics of the effect of child benefits on labor force participation of mothers (women aged 20–49 years with one or two children)

Socioeconomic variables	Partnered women	Single women
Treatment effect in the 2nd half of 2016 (θ_{2016})	**−0.016** **	**−0.017**
Treatment effect in the 1st half of 2017 (θ_{2017})	**−0.026*** **	**−0.023** **
Observations	300,792	174,872
R-squared	0.119	0.316

The coefficients of partnered women have significance levels of 0.023 and 0.001 for Q2 2016 and Q12017 respectively. The coefficients of single women have significance levels of 0.119 and 0.048 for Q2 2016 and Q12017 respectively.

Note: The coefficients of all covariates are available upon request. Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.

Source: Own calculations based on Polish Labor Force Survey data.

One may expect that the treatment effect for partnered mothers would be higher because their labor force participation is likely to be more elastic. Thus, the same treatment effect for the entire period analyzed may be quite surprising. Yet, the dynamics of the effect shows that single women indeed reacted more slowly to the introduction of the 'Family 500+" benefit.

Overall, in absolute terms, the estimates suggest that up to 100,000 women did not participate in the labor market in the first half of 2017 due to the "Family 500+" benefit. This corresponds to 1.3% of all women participating in the labor market in Poland and 1.9% of active women aged 20–49 years.

3.2 **Testing for heterogeneous effects**

We also test whether the impact of the "Family 500+" benefit on the labor force participation rate of women with children was heterogeneous across different groups of women. To verify this, the group and postperiod dummies and their combination were made to interact with the socioeconomic variables described in Table 1, using the following equation:

$$A_{it} = \alpha + \beta X_{it} + \delta Y_t + \gamma T_i + \sigma T_i \cdot X_{it}^c + \theta Post_t \cdot T_i + \mu Post_t \cdot T_i \cdot X_{it}^c + \rho Post_t \cdot X_{it}^c + \varepsilon_{it}. \quad (2)$$

with the notation as in Equation 1. For parsimony, we test heterogeneity with a simple postperiod dummy and run regressions separately for each socioeconomic variable. X_{it}^c is a subvector of X_{it} for the variable of interest. Moreover, σ, μ, and ρ are newly added vectors of the parameters to be estimated. In particular, μ is a vector with a set of parameters capturing different treatment effects by socioeconomic group.

The heterogeneous treatment effects for partnered women are displayed in Table 5. For single women, the treatment effects do not differ significantly by socioeconomic group in most of the cases. The full set of results is presented in Table A2 in the Appendix.

The estimates confirm that the effect of child benefits is the strongest for women with lower levels of education. It lends support to the idea that women with weak earnings are most likely to react to an increase in transfers, in particular when they can rely on the income of a partner. Women living in midsized towns seem to be most strongly affected, which renders their labor market situations more difficult and earnings lower – which in turn make the new benefit more generous in relative terms. The youngest age group seems to react most strongly to the introduction of child benefits (which may also reflect potentially lower earnings for labor market entrants), while the treatment effect for partnered women older than 30 years of age is insignificant.

Whether women have one or two children does not seem to matter among partnered mothers, although it differentiates the effect significantly among single mothers (Table A2 in Appendix). The treatment effect among single mothers of two children was 4.8 percentage points – 4.0 percentage points lower than among single mothers of one child. Such a relatively large reaction of single mothers of two children is likely related to the eligibility ceiling for the first child and the fact that is "easier" to fall below it for single earners.

In terms of age of the youngest child, mothers whose youngest child was <1 year or between 4 and 6 years of age reacted less strongly than others. The treatment effect for mothers of children <1 year was even positive. This has to be interpreted with caution as women on maternity leave are counted as employed. Smaller coefficients for mothers of children aged

Table 5 Heterogeneous treatment effects for partnered women (treated group - women with one or two children, control group - childless women)

Model	estimated coefficient
Model with interactions for educational level	
(Educational level – base: tertiary)	
Treatment effect for tertiary education	−0.009
Difference in treatment effect for secondary education	−0.023**
Difference in treatment effect for basic vocational or lower education	−0.036**
Model with interactions for place of residence	
(Place of residence – base: city with >100,000 inhabitants)	
Treatment effect for cities with >100,000inhabitants	−0.004
Difference in treatment effect for cities with 20,000–100,000 inhabitants	−0.051***
Difference in treatment effect for cities with <20,000 inhabitants	−0.011
Difference in treatment effect for rural areas	−0.013
Model with interactions for age	
(Age – base: 30–39 years)	
Treatment effect for age 30–39 years	−0.010
Difference in treatment effect for age 20–29 years	−0.034***
Difference in treatment effect for age 40–49 years	−0.012
Model with interactions for number of children	
(Number of children – base: two)	
Treatment effect for mothers of two children	−0.024***
Difference in treatment effect for mothers of one child	0.006
Model with interactions for age of the youngest child	
(Age of the youngest child – base: 7–12 years)	
Treatment effect for mothers of children aged 7–12 years	−0.040***
Difference in treatment effect for mothers of children aged 0–1 years	0.071***
Difference in treatment effect for mothers of children aged 2–3 years	−0.000
Difference in treatment effect for mothers of children aged 4–6 years	0.021**
Difference in treatment effect for mothers of children aged 13–17 years	0.012

Source: Own calculations based on Polish Labor Force Survey data.

between 4 and 6 years may be puzzling. One possible explanation is that the income effect was counterbalanced for those mothers. It may be related to weak childcare infrastructure and high costs of private kindergartens. Maybe the 500+ benefit may have made it possible for some mothers of children in preschool age to return to work and afford the childcare costs.

3.3 **Robustness tests**

To test the validity of our results, we run a series of robustness checks. First, we consider women with two children only (who are always eligible to the 500+ benefit) as the treated group, comparing them to childless women and leaving out women with one child. Secondly, we use a dynamic perspective and refer to panel data on flows between activity and inactivity. Thirdly, we modify the assignment of women with one child to the treatment or control group using information on the take-up of social assistance benefits. Fourthly, we reinforce our difference-in-differences framework with a matching procedure. In the final, fifth robustness test, we look at employment rather than activity as an outcome variable. All five robustness checks (R1–R5 below) confirm a negative impact of the treatment on female labor market outcomes.

3.3.1 **R1: The effect only for women with two children**

As a first robustness check, we compare changes in participation rates among women with two children (treated group) to changes in participation rates among childless women, leaving out women with one child, whose assignment to the proper group is more challenging. Table 6 summarizes the results, which are statistically significant and even stronger in size for single women than in the baseline.

3.3.2 **R2: Flow analysis**

We make use of the time panel dimension of our data (however, available only as 1-year transitions) and investigate the impact of the "Family 500+" benefit on labor market withdrawal, or the flow from activity to inactivity, rather than the level of activity, thus varying the outcome variable. In particular, we compare the yearly flows from activity to inactivity. Table 7 summarizes the results, which point to a statistically significant difference in labor market withdrawal rates, which are higher for women with children, in particular the single ones.

3.3.3 **R3: Modifying the control/treatment group assignment for mothers of one child**

To test the impact of the assignment of women with one child to the treatment and control group on our results, we redefine these groups in the following way. We define the treatment group as women with two children and those with one child who are eligible for the 'Family 500+" transfer. Because there is no variable that would allow us to directly identify those receiving the "Family 500+" benefit in the data for 2016, we derived it from other information – whether a woman declares receiving a social benefit in the form of family benefits or social assistance, as this implies eligibility for the 500+ benefit as well. The control group includes mothers with one child who do not report receipt of any social assistance benefits. Most of

Table 6 The effect of child benefits on labor force participation of mothers with two children, separately for partnered and single women

Socioeconomic variables	Partnered women	Single women
Treatment effect in the 2nd half of 2016 (θ_{2016})	−0.018***	−0.053***
Treatment effect in the 1st half of 2017 (θ_{2017})	−0.030***	−0.040***
Observations	184,820	145,496
R-squared	0.122	0.340

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.

Table 7 The effect of child benefits on labor market withdrawal rates, separately for partnered and single women (women aged 20–49 years with one or two children)

Socioeconomic variables	Partnered women	Single women
Treatment effect (θ)	0.018***	0.03***
Observations	47,740	21,230
R-squared	0.028	0.045

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.

them will not be eligible for the 500+ transfer. This approach allows us to gage differences in labor market behavior across eligible and ineligible mothers, rather than comparing mothers with childless women – an additional way to test the robustness of our results. However, because the eligibility ceiling for social assistance is lower than that for the "Family 500+" benefit, mothers with household income that falls between those two eligibility ceilings will be wrongly assigned to the control group. That said, the two income ceilings are close in the 2016 and 2017 data and, therefore, the corresponding bias should be limited. According to our estimates based on 2016 Household Budget Survey data, wrong assignment should concern around 12% of households with one child. Furthermore, we can only use the social assistance eligibility information for 2016 and 2017 data, as the income thresholds were changed in 2016 and the data for previous years is not available. We run the redefined model on the panel data and study labor market withdrawals between 2016 and 2017, as in the previous model (R2). This approach allows us to use both the 2016 and 2017 social assistance declaration for each individual and thus better assign mothers to the control/treatment groups. The results are positive and statistically significant for partnered women (Table 8).

3.3.4 **R4: Difference-in-differences framework with a matching procedure**

We use the previous difference-in-differences and flow analysis framework, but this time, to increase the comparability of individuals across the treated and control groups and to lower the potential selection bias, we employ a kernel propensity score matching technique (Blundell and Dias, 2009). For each individual, we estimate the probability that she would be in the treated group based on the socioeconomic characteristics described in Table 9. This probability is referred to as the propensity score. For each treated subject, we derive a weighted average of all individuals in the control group, with weights based on the distance of their propensity score to that of the treated individual. The highest weight is given to those with propensity scores closest to that of the treated unit. Once we weight the covariates based on the propensity score matching technique, the differences in means between the treated and the control groups become statistically insignificant for all variables, substantially reducing the selection bias.

The estimated treatment effects are displayed in Table 10. These effects are positive and statistically significant. The results suggest that after the "Family 500+" program was introduced, the gap in the quarterly withdrawal rate between the treated and the control groups was 2.2 percentage points higher than it was a year earlier for partnered women, and 1.4 percentage

Table 8 The effect of child benefits on labor market withdrawal rates, separately for partnered and single women (women aged 20–49 years with one or two children)

Socioeconomic variables	Partnered women	Single women
Treatment effect (θ)	0.016**	0.07
Observations	10,310	6,322
R-squared	0.02	0.045

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1. Compared to the main specification, we use a more precise assignment of women with one child to control/treatment groups.

Source: Own calculations based on Polish Labor Force Survey data.

Table 9 Balancing *t*-test of differences in means of covariates between the control and treated groups, 2015

Socioeconomic variables	Raw			With weighted covariates		
	Control	Treated	Difference	Control	Treated	Difference
Unemployed (share among active)	0.057	0.084	0.027***	0.102	0.090	−0.012
Age: 20–24 years	0.023	0.010	−0.013***	0.011	0.011	0.000
Age: 25–29 years	0.118	0.068	−0.050***	0.072	0.073	0.001
Age: 30–34 years	0.212	0.230	0.018**	0.241	0.239	−0.002
Age: 35–39 years	0.218	0.366	0.149***	0.350	0.371	0.021
Age: 40–44 years	0.250	0.244	−0.006	0.240	0.226	−0.014
Age: 45–49 years	0.179	0.081	−0.098***	0.086	0.081	−0.005
Level of education: high	0.448	0.454	0.006	0.444	0.447	0.003
Level of education: medium	0.345	0.338	−0.008	0.345	0.342	−0.003
Level of education: low	0.206	0.208	0.002	0.211	0.211	0.000
Age of the youngest child: 0–3 years	0.190	0.236	0.046***	0.231	0.246	0.015
Age of the youngest child: 4–6 years	0.178	0.246	0.068***	0.244	0.241	−0.003
Age of the youngest child: 7–17 years	0.633	0.518	−0.114***	0.525	0.513	−0.012
Main source of household income: contract work	0.750	0.704	−0.046***	0.698	0.701	0.003
Main source of household income: own agricultural farm	0.070	0.085	0.015***	0.097	0.092	−0.005
Main source of household income: self-employment	0.117	0.135	0.018***	0.121	0.127	0.006
Main source of household income: other	0.063	0.076	0.013***	0.084	0.081	−0.004
Presence of the partner in the household	0.816	0.853	0.037***	0.844	0.853	0.010
Place of residence: large city	0.278	0.254	−0.024***	0.229	0.234	0.005
Place of residence: medium city	0.200	0.176	−0.024***	0.180	0.175	−0.005
Place of residence: small city	0.136	0.127	−0.009	0.135	0.137	0.001
Place of residence: rural area	0.386	0.444	0.057***	0.456	0.455	−0.001
Number of observations	3,007	2,309	–	3,007	2,309	–

Note: Significance levels for differences: ***0.01, **0.05, and *0.1.

Source: Own calculations based on Polish Labor Force Survey data.

Table 10 The impact of child benefits on labor market withdrawal rates – results from a difference-in-differences estimation with kernel propensity score matching

Socioeconomic variables	Partnered women	Single women
Treatment effect (θ)	**0.022*** **	**0.014*** **
Observations	10,310	6,311

The coefficients of partnered women and single women have significance levels of 0.002, and 0.001 respectively.
Source: Own calculations based on Polish Labor Force Survey data.

Table 11 The effect of child benefits on employment of mothers, separately for partnered and single women, aged 20–49 years, with one or two children

Socioeconomic variables	Partnered women	Single women
Treatment effect in the 2nd half of 2016 (θ_{2016})	−0.020***	−0.002
Treatment effect in the 1st half of 2017 (θ_{2017})	−0.029***	−0.036***
Observations	299,662	129,506
R-squared	0.116	0.277

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.

points for single women. This is a large effect, considering that the average withdrawal rates vary between 1% and 4%. In the second half of 2016, the average quarterly withdrawal rate for the treated group was, on average, 3.9%. Our results imply that it would have been less than half of this figure had the "Family 500+" benefit not been introduced. In absolute terms, this suggests that, on average, 50,000–54,000 women withdrew from the labor market in the second half of 2016 due to the "Family 500+" benefit. This is compatible with the estimates obtained in the first part of our analysis.

3.3.5 **R 5: The effect on employment rate**

As a last robustness check, we use our baseline mode but look at employment versus nonemployment (unemployment or inactivity) as an outcome variable rather than looking at activity versus inactivity. We might expect that most of the negative impact of the "Family 500+" benefit concerned unemployed women, who stopped searching for a job, while the effect on those employed would be weaker. This turns out not to be the case: the effect among employed women (compared to nonemployed) is even a bit stronger than the results for inactivity (Table 11 summarizes the results).

4 Conclusions

The results presented in this paper suggest that the introduction of child benefit in 2016 in Poland had a significantly negative impact on labor force participation and employment of eligible mothers. This finding is robust to changes in the precise outcome variable we look at (labor force participation, employment, or labor market withdrawal), to different definitions of the treated and the control groups in our difference-in-differences methodology, and to different estimation approaches. The effects are sizeable, implying that labor force participation and

employment would have been 2.5–3 percentage points higher by mid-2017 in the absence of the reform. Testing for heterogeneity across different groups reveals that the effects are strongest for the lowest-educated mothers, in line with previous results in the literature.

Several advanced countries are looking for a way to improve low fertility rates and tackle the persistent poverty rates among families with children. Many of them turn to a redesigning of family support and childcare benefits. We hope the present study may be informative for the choice of policy design. Our finding of a sizeable negative effect of the Polish child benefit on female labor force participation, despite a booming labor market and increasing wages, suggests that there is a need to consider short- and long-term labor market effects in the cost–benefit analysis of public policies.

In terms of questions for further research, it will be interesting to study – at a later point in time – the extent to which the new child benefits may lengthen career interruptions of mothers and the ensuing impact on their earnings prospects when they return to the labor market. Furthermore, whether fertility is influenced positively by the new benefit introduced in Poland, as intended, would be an interesting research question for the future, as many countries struggle to alleviate demographic changes and increase the low birth rates.

The size of the effect on labor supply of the "Family 500+" benefit may be influenced by the existing tax disincentives for second earners, insufficient childcare coverage, gender pay gaps, and gendered norms. Studying how these features influence the impact of child benefits on labor supply would shed light on policies that can help alleviate any unwanted side effects of such transfers. Finally, the child benefits might also influence labor supply of men and informality, which would be interesting fields for study for the future.

Endnotes

[a] The benefit became universal as of July 2019; therefore, our study focuses on the period directly prior to the 2016 policy implementation. [b] We have also verified whether there have been any important, abrupt changes in coverage of childcare facilities and educational enrollment around the time the benefit was introduced, as this could be a potential confounding factor undermining our empirical strategy. Poland has experienced a steady growth in the coverage of crèches and kindergartens since the early 2010s, with no break around the reform. There were no changes in school enrollment either.

Declarations

Availability of data and material

This study is based on data from Statistics Poland, namely, microdata from Labor Force Survey 2010–2017, obtained upon agreement, which prohibits sharing the data. Statistics Poland has no responsibility for the results and the conclusions, which are those of the authors. The usual disclaimers apply. All errors are ours.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

IM and AK ran the data cleaning and the empirical analysis. IM and NB drafted the manuscript. All authors read and approved the final manuscript.

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Appendix

Table A1 The effect of child benefits on labor force participation of mothers, for women aged 20–49 years with one or two children: full set of estimated coefficients

Socioeconomic variables		Partnered women	Single women
	Group effect (γ)	−0.057***	0.002
	Treatment effect (θ)	**−0.021*** **	**−0.020*** **
Half year - base: 2nd half of 2015	1st half of 2010	0.017***	0.071***
	2nd half of 2010	0.011***	0.059***
	1st half of 2011	0.013***	0.049***
	2nd half of 2011	0.010**	0.048***
	1st half of 2012	0.010**	0.051***
	2nd half of 2012	0.007	0.040***
	1st half of 2013	0.000	0.042***
	2nd half of 2013	0.003	0.028***
	1st half of 2014	0.007	0.036***
	2nd half of 2014	0.005	0.018***
	1st half of 2015	0.002	0.012**
	1st half of 2016	−0.004	0.019***
	2nd half of 2016	−0.003	0.017***
	1st half of 2017	0.000	0.025***
Quarter – base: 1st or 3rd	2nd quarter	−0.002	0.001
	4th quarter	0.002	−0.001
Age - base: 30–39 years	20–29	−0.087***	−0.026***
	40–49	−0.013***	0.004
Place of residence - base: city with >100,000 inhabitants	City with <100,000 inhabitants	−0.013***	0.007***
	Rural areas	−0.015***	0.006**
Educational level - base: tertiary	Secondary	−0.146***	−0.148***
	Basic vocational or lower	−0.235***	−0.322***
Number of children - base: two	One child	0.024***	0.048***
Age of the youngest child - base: 7–12 years	0–1 years	−0.214***	−0.319***
	2–3 years	−0.161***	−0.201***
	4–6 years	−0.051***	−0.050***
	13–17 years	0.046***	0.023***
	Student status	−0.094***	−0.496***
Voivodeships - base: Zachodniopomorskie	Dolnośląskie	0.043***	0.050***
	Kujawsko–Pomorskie	0.043***	0.034***
	Lubelskie	0.077***	−0.012**
	Lubuskie	0.049***	0.002
	Łódzkie	0.078***	0.048***
	Małopolskie	0.039***	0.019***
	Mazowieckie	0.056***	0.058***
	Opolskie	0.026***	0.025***
	Podkarpackie	0.055***	−0.002
	Podlaskie	0.078***	0.006
	Pomorskie	0.011**	0.041***
	Śląskie	0.015***	0.050***
	Świętokrzyskie	0.054***	0.012*

(*continued*)

Table A1 Continued.

Socioeconomic variables		Partnered women	Single women
	Warmińsko–Mazurskie	0.022***	−0.029***
	Wielkopolskie	0.028***	0.056***
Labor market status of partner - base: employed	Unemployed	−0.001	
	Inactive	−0.076***	
Educational level of partner - base: tertiary	Secondary	−0.003	
	Basic vocational or lower	−0.020***	
Constant		0.991***	0.920***
Observations		300,792	174,872
R-squared		0.119	0.316

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.

Table A2 Heterogeneous treatment effects for single women (treated group - women with one or two children, control group - childless women)

Model	estimated coefficient
Model with interactions for educational level	
(Educational level – base: tertiary)	
Treatment effect for tertiary education	−0.008
Difference in treatment effect for secondary education	−0.013
Difference in treatment effect for basic vocational or lower education	−0.013
Model with interactions for place of residence	
(Place of residence – base: city with >100,000inhabitants)	
Treatment effect for cities with >100,000inhabitants	−0.008
Difference in treatment effect for cities with 20,000–100,000inhabitants	−0.001
Difference in treatment effect for cities with <20,000inhabitants	−0.024
Difference in treatment effect for rural areas	−0.016
Model with interactions for age	
(Age – base: 30–39 years)	
Treatment effect for age 30–39 years	−0.011
Difference in treatment effect for age 20–29 years	−0.006
Difference in treatment effect for age 40–49 years	−0.008
Model with interactions for number of children	
(Number of children – base: two)	
Treatment effect for mothers of two children	−0.048***
Difference in treatment effect for mothers of one child	0.040**
Model with interactions for age of the youngest child	
(Age of the youngest child – base: 7–12 years)	
Treatment effect for mothers of children aged 7–12 years	−0.036***
Difference in treatment effect for mothers of children aged 0–1 years	0.067**
Difference in treatment effect for mothers of children aged 2–3 years	−0.005
Difference in treatment effect for mothers of children aged 4–6 years	0.023
Difference in treatment effect for mothers of children aged 13–17 years	0.025

Note: Robust standard errors were computed. Significance levels: ***0.01, **0.05, and *0.1.
Source: Own calculations based on Polish Labor Force Survey data.