Online Appendix

"Universal child benefit and child poverty: the role of fertility adjustments"

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Online Appendix A Additional Figures and Tables

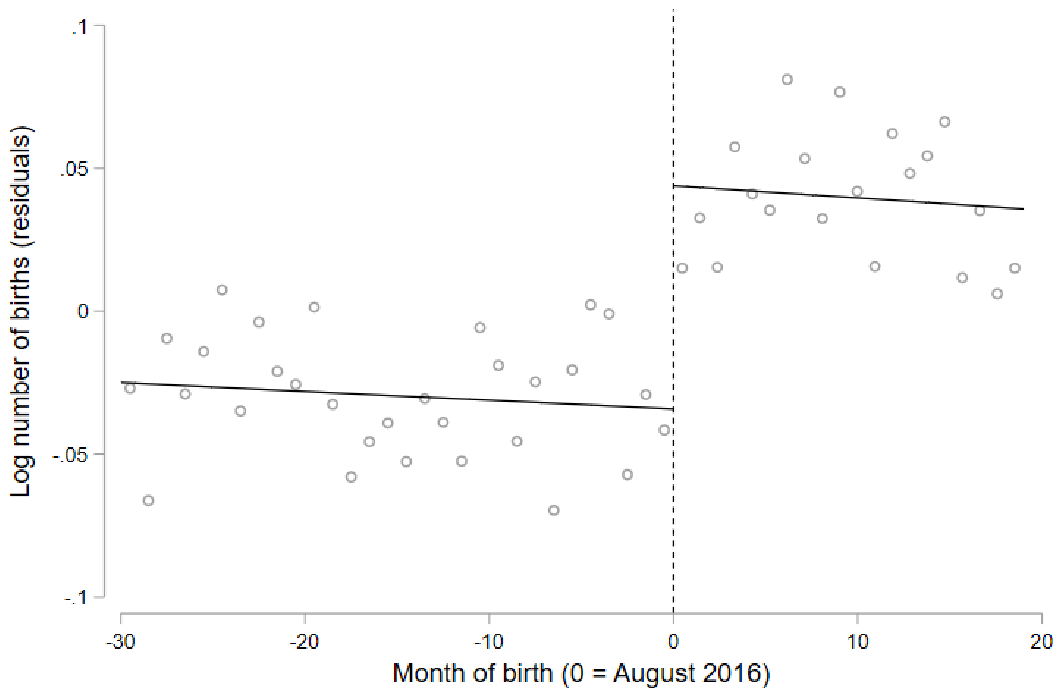


Figure A.1: Short-term effects on births, monthly bins

Notes: Figure shows the dependent variable per month. The line denotes linear trend estimated on both sides of the cutoff month.

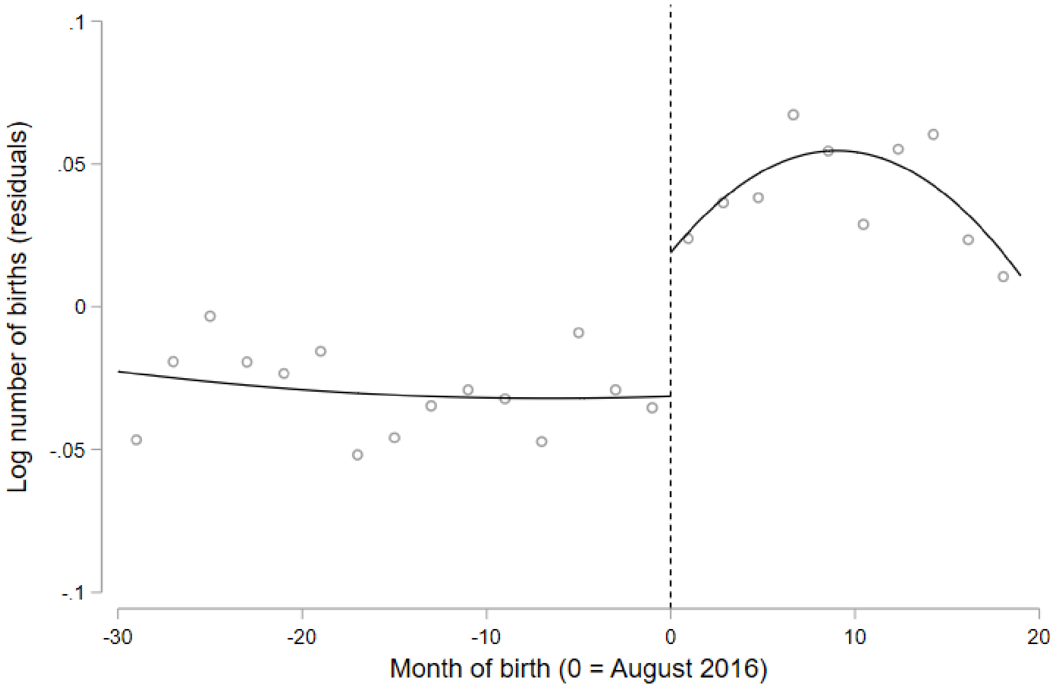


Figure A.2: Short-term effects on births, quadratic trend

Notes: Figure shows the dependent variable in bimonthly bins. The line denotes quadratic trend estimated on both sides of the cutoff month.

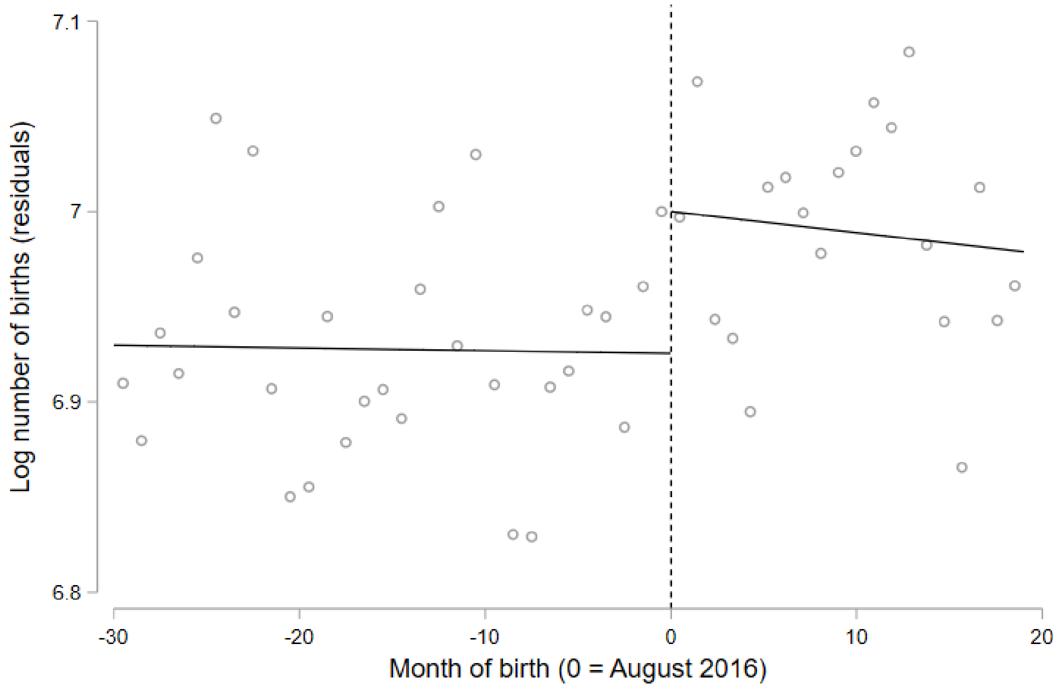


Figure A.3: Short-term effects on births, no residualization

Notes: Figure shows the dependent variable without residualization (raw log number of births) per month. The line denotes linear trend estimated on both sides of the cutoff month.

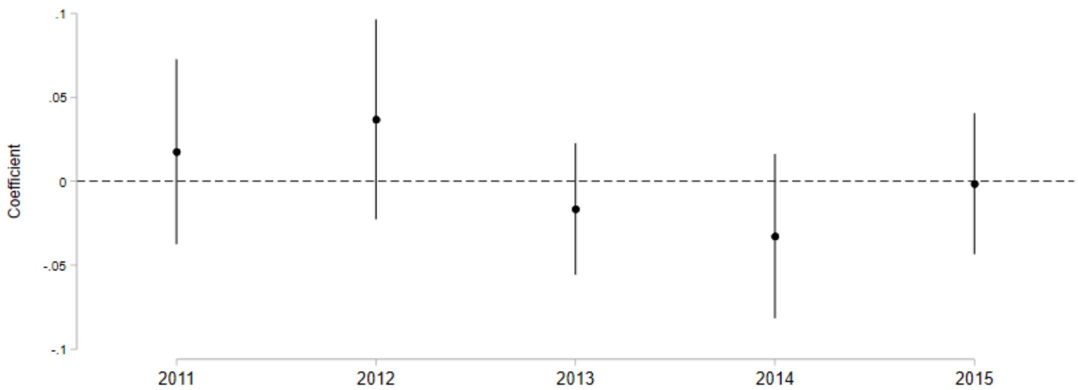


Figure A.4: Placebo cutoff dates

Notes: Figure shows RD estimates of fertility effects for placebo cutoff dates (August 2011, August 2012, August 2013, August 2014, August 2015).

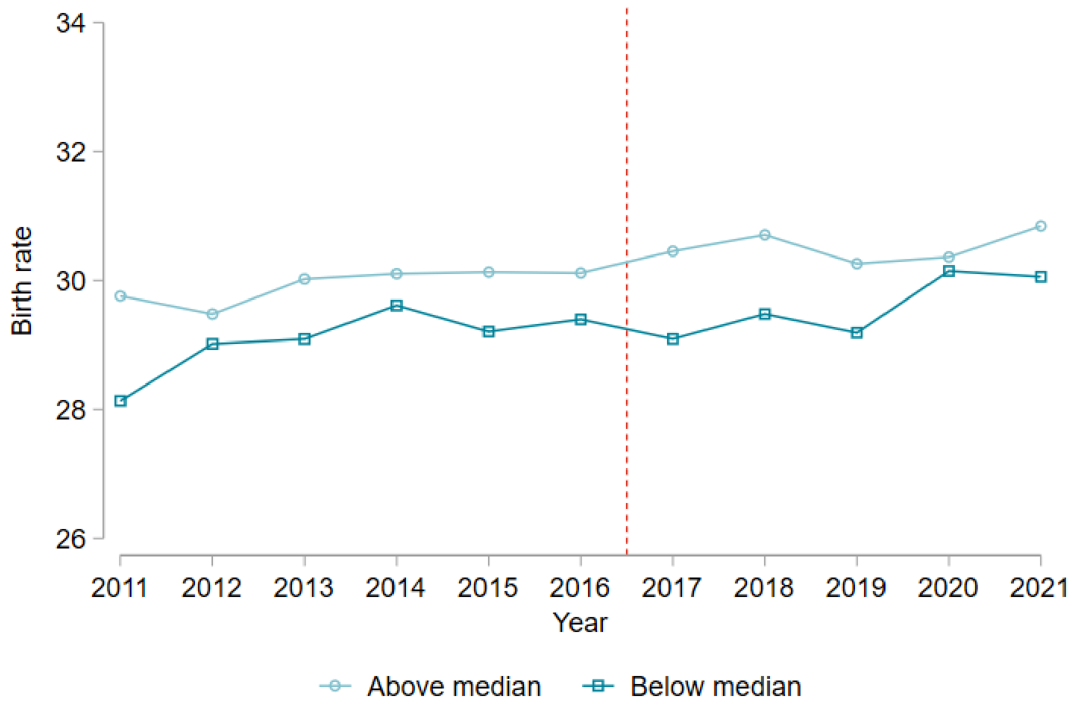
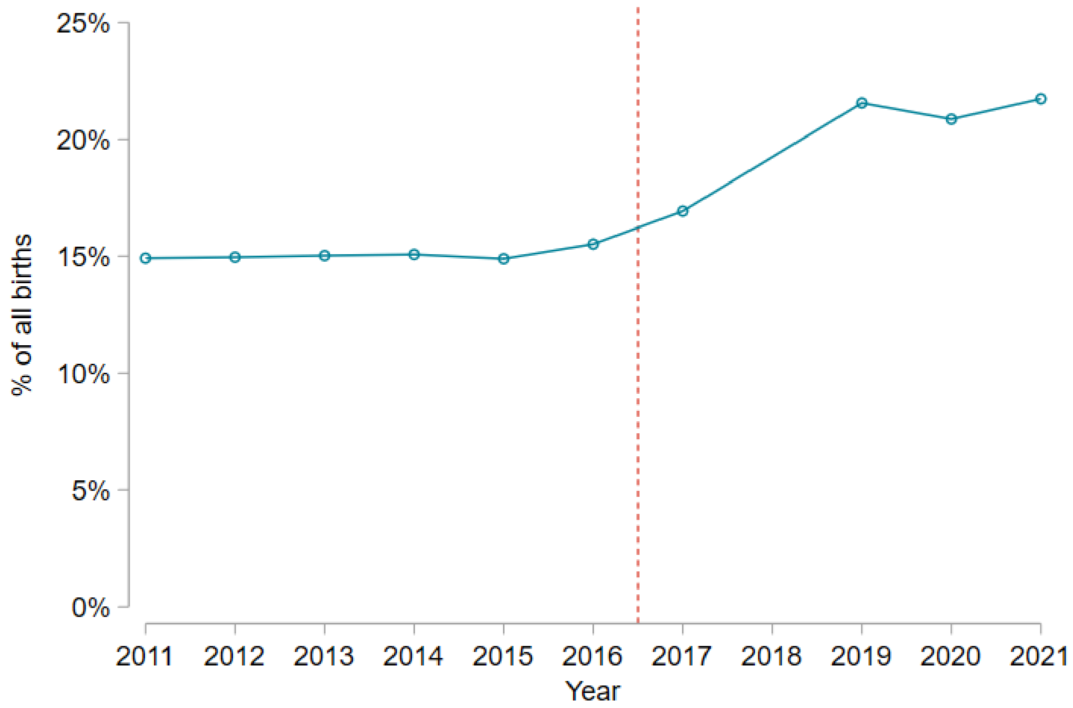


Figure A.5: Average age at first birth, below and above median earnings

Notes: Figure shows the average age at first birth for couples with total couple earnings equal to or above the median and birth rates for couples with total earnings below the median.

Figure A.6: Births by birth order: third child or higher



Notes: Figure shows births of third or higher order as a percentage of all births. Data is based on an administrative registers. In 2018, the birth certificate template was changed and this led to many errors made by physicians. Hence, the data on births according to the birth order for 2018 is not available.
Source: Demographic Yearbook of Poland, Statistics Poland.

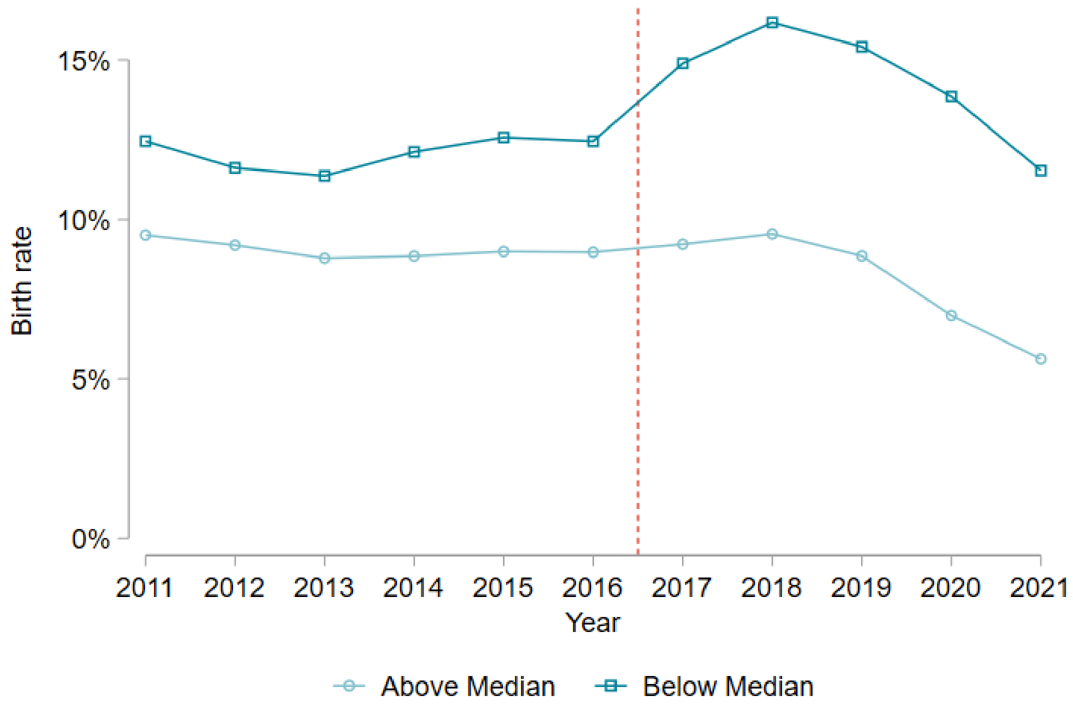


Figure A.7: Birth rates by total couple earnings

Notes: Figure shows the birth rates for couples with total couple earnings equal to or above the median and birth rates for couples with total earnings below the median.

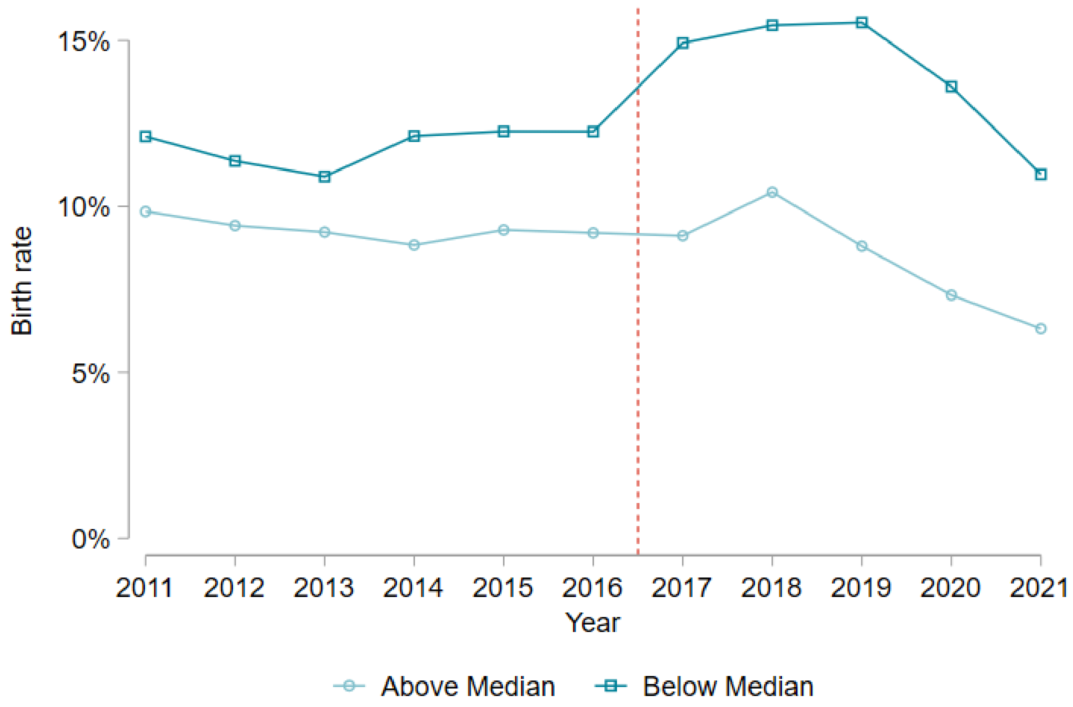


Figure A.8: Birth rates by total household earnings

Notes: Figure shows the birth rates for couples with total household earnings (the sum of earnings of all household members) equal to or above the median and birth rates for couples with total earnings below the median.

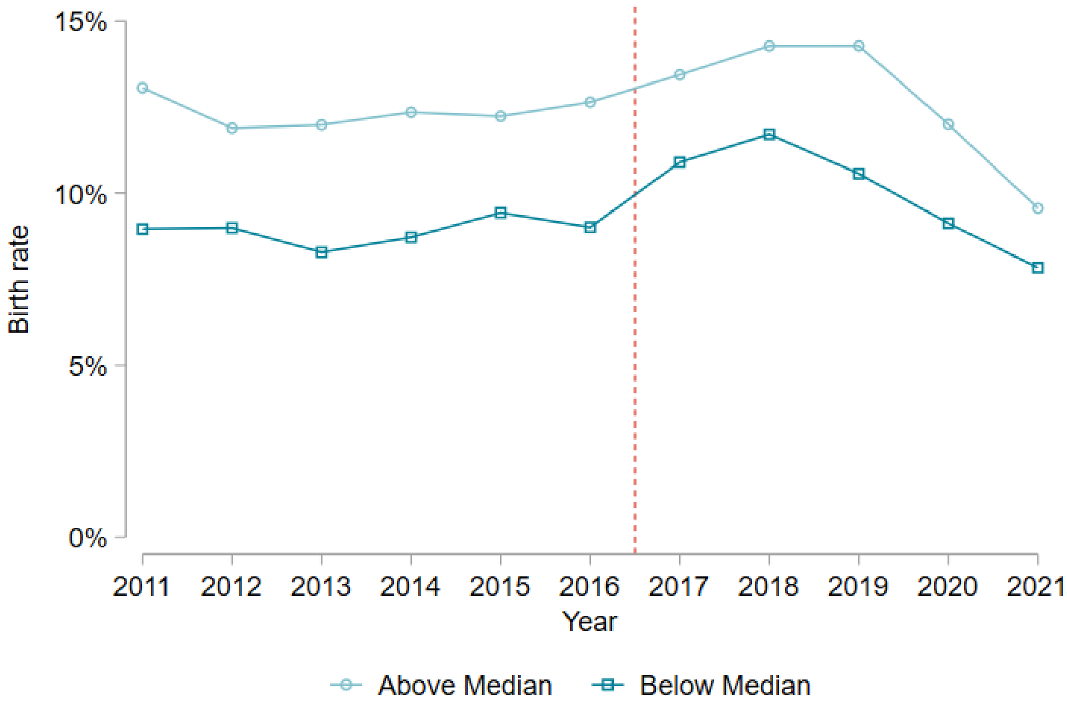
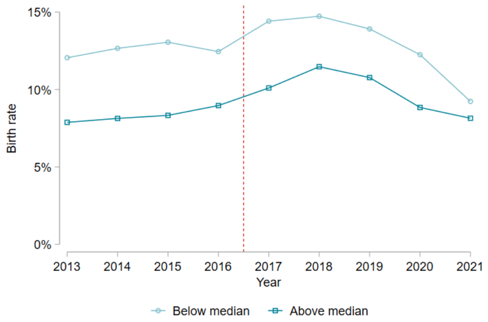


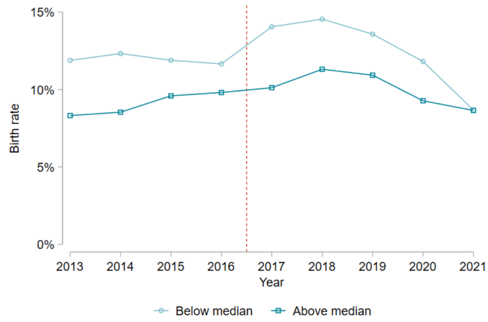
Figure A.9: Birth rates by equivalized partner's earnings

Notes: Figure shows the birth rates for couples with male partner's earnings equal to or above the median and birth rates for couples with male partner's earnings below the median.

(a) Unhealthy food



(b) Alcohol to food ratio



(c) Vodka (any)

(d) Cigarettes (any)

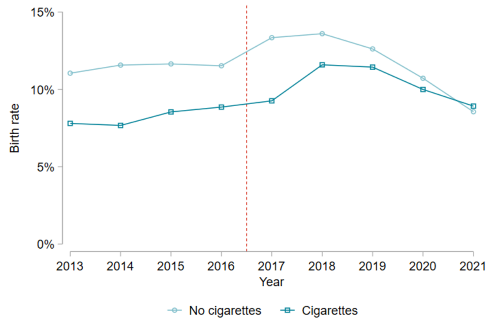


Figure A.10: Birth rates, harmful consumption

Notes: Figure shows the birth rates (the probability of giving a birth within the previous 12 months) for various groups of women depending on household consumption of harmful products. Figure A.10a shows birth rates for women depending on household's expenditure on energy-dense, nutrient-poor foods (as a share of all food expenditure, above and below median). Figure A.10b shows birth rates for women depending on household's alcohol expenditure (divided by food expenditure, above and below median). Figure A.10c shows birth rates for women in households with non-zero expenditure on vodka and liquors and women in households with zero expenditure on vodka and liquors. Figure A.10d shows birth rates for women in households with non-zero expenditure on cigarettes and women in households with zero expenditure on cigarettes.

(a) Extensive margin

(b) Intensive margin

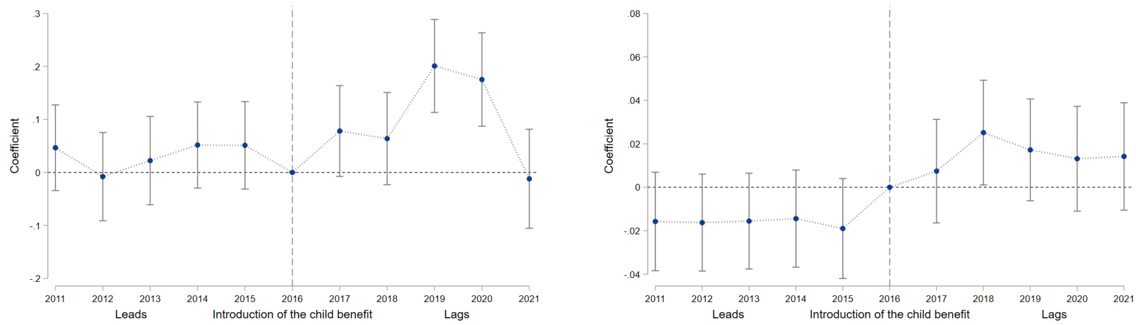


Figure A.11: Birth rates and couple earnings, intensive and extensive margin.

Notes: Figure shows coefficients and 95% confidence intervals of the interaction between year fixed effects and a dummy that equals one for couples with earnings below median and zero otherwise. In Figure A.11a, the dependent variable is equal to one if the couple gave birth to their first child and zero otherwise (the sample is restricted to couples who had no children 12 months before). In Figure A.11b, the dependent variable is equal to one if the couple gave birth to their second or higher parity child and zero otherwise (the sample is restricted to couples who had at least one child 12 months before). Standard errors are clustered at the level of the household.

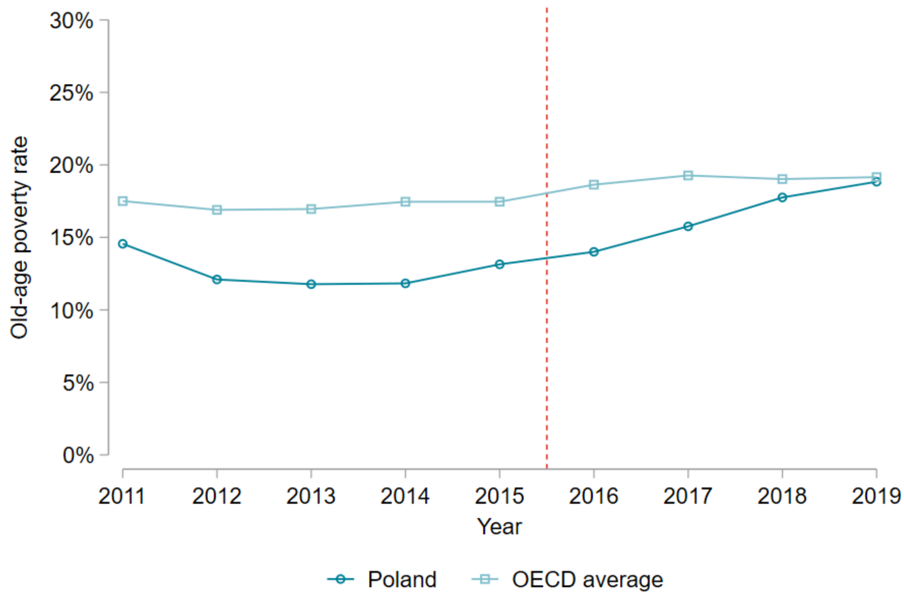


Figure A.12: Old-age poverty rates in Poland and OECD (2011-2019)

Notes: Figure shows poverty rate among people aged 66 years old or more in Poland and the average for other OECD countries. Source: OECD

Table A.1: Short-term effects on births, 2010 as reference year

	10 years (1)	5 years (2)	12-12m (3)	9-9m (4)	3-3m (5)
Births	0.080***	0.072***	0.056***	0.070***	0.037
	(0.013)	(0.019)	(0.020)	(0.018)	(0.051)
Observations	121	61	25	19	7
Years included	2010-2019	2014-2018	2015-2017	2015-2017	2016
Linear trend in m	Y	Y	Y	Y	Y
Quadratic trend in m	Y	Y	Y	N	N

Notes: Table shows RD estimates with various bandwidths. The dependent variable is the log number of births measured as a difference from the 2010 month-of-the-year (e.g., the value of the dependent variable in August 2016 is the difference between log number of births per day in August 2016 and the log number of births per day in August 2010). The "m" stands for months. In all regressions, I include a linear trend of the running variable. For bandwidths longer than 9 months, I additionally include a quadratic trend. Heteroskedasticity-robust standard errors are reported.

Table A.2: Short-term effects on births, annual growth rate

	10 years (1)	5 years (2)	12-12m (3)	9-9m (4)	3-3m (5)
Births	0.046***	0.027	0.062***	0.047***	0.067***
	(0.015)	(0.016)	(0.021)	(0.017)	(0.023)
Observations	80	43	25	19	7
Years included	2011-2018	2014-2018	2015-2017	2015-2017	2016
Linear trend in m	Y	Y	Y	Y	Y
Quadratic trend in m	Y	Y	Y	N	N

Notes: Table shows RD estimates with various bandwidths. The dependent variable is the log number of births measured as an annual difference (e.g., the value of the dependent variable in August 2016 is the difference between log number of births per day in August 2016 and the log number of births per day in August 2015). I include at most 12 months after the cutoff date, as the introduction should not affect growth rates in the long run. The "m" stands for months. In all regressions, I include a linear trend of the running variable. For bandwidths longer than 9 months, I additionally include a quadratic trend. Heteroskedasticity-robust standard errors are reported.

Table A.3: Short-term effects on births, parental leave reforms

	2013 Reform				2016 Reform			
	5 years (1)	12-12m (2)	9-9m (3)	3-3m (4)	5 years (5)	12-12m (6)	9-9m (7)	3-3m (8)
Births	0.025**	0.005	0.016	-0.008	-0.021	-0.014	-0.017	-0.039
	(0.011)	(0.019)	(0.011)	(0.016)	(0.023)	(0.038)	(0.030)	(0.046)
Observations	60	24	18	6	60	24	18	6
Years included	2011-2015	2012-2014	2012-2014	2013	2014-2018	2015-2017	2015-2016	2015-2016
Linear trend in m	Y	Y	Y	Y	Y	Y	Y	Y
Quadratic trend in m	Y	Y	N	N	Y	Y	N	N

Notes: Table shows RD estimates with various bandwidths. The dependent variable is the log number of births (residuals from the regression of log births on the month-of-the-year dummies). The "m" stands for months. I use two alternative cutoff dates corresponding to birth date cutoffs relevant for two parental leave reforms: June 2013 and January 2016. In all regressions, I include a linear trend of the running variable. For bandwidths longer than 9 months, I additionally include a quadratic trend. Heteroskedasticity-robust standard errors are reported.

Table A.4: Per child expenditures

	Total (1)	Food (2)	Education (3)	Child clothes (4)	Health (5)	Utilities (6)	Personal care (7)
				Panel A. 2013-2015			
Number of Children	291.763***	125.944***	59.193***	38.284***	19.189***	39.268***	9.885***
	(16.541)	(8.343)	(5.897)	(3.026)	(6.011)	(3.652)	(3.208)
Earnings Below Median × Number of Children	-163.649***	-46.730***	-48.403***	-23.998***	-22.327***	-17.485***	-4.706
	(18.194)	(9.620)	(6.089)	(3.354)	(6.365)	(4.370)	(3.435)
Adj. R-Squared	0.22	0.11	0.12	0.08	0.10	0.06	0.16
Mean of outcome	1604.20	867.50	84.15	87.34	159.90	265.99	139.32
Observations	15,648	15,648	15,648	15,648	15,648	15,648	15,648
				Panel B. 2017-2019			
Number of Children	341.356***	138.026***	73.051***	48.256***	31.008***	36.694***	14.321***
	(18.834)	(9.418)	(6.286)	(3.475)	(6.172)	(3.632)	(3.651)
Earnings Below Median × Number of Children	-131.112***	-34.845***	-50.137***	-17.580***	-19.361***	-5.812	-3.378
	(20.811)	(11.043)	(6.643)	(4.048)	(6.736)	(4.581)	(3.959)
Adj. R-Squared	0.16	0.10	0.11	0.07	0.06	0.08	0.10
Mean of outcome	1802.09	985.89	89.08	100.20	177.37	291.10	158.44
Observations	15,135	15,135	15,135	15,135	15,135	15,135	15,135
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age, education, urban area	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table shows the coefficients from OLS regressions of selected categories of household expenditure on the number of children interacted with a dummy variable denoting the bottom half of equivalized couple earnings distribution. I control for year fixed effects, region fixed effects, urban area dummy, as well as female and male partner's education and age. The sample consists of households with partnered women aged 25-39 and at least one child under the age of 18. Standard errors are clustered at the level of the household.
* $p < .10$; ** $p < .05$; *** $p < .01$

Online Appendix B Theoretical Appendix

In this section, I derive the predictions listed in the main text.

B.1 The effect of m on n

Since the optimal education e does not depend on m, the fertility rule

$$n = \frac{\gamma\,(1-\beta\alpha)\,(y+m)}{y\tau^q - b}$$

yields

$$\frac{\partial n}{\partial m} = \frac{\gamma\,(1-\beta\alpha)}{y\tau^q - b} \;>\; 0 \tag{1}$$

I then check its income gradient:

$$\frac{d}{dy}\left(\frac{\partial n}{\partial m}\right) = -\frac{\gamma\,(1-\beta\alpha)\,\tau^q}{(y\tau^q - b)^2} \;<\; 0 \tag{2}$$

Hence $\partial n/\partial m$ is strictly decreasing in y.

B.2 The effect of b on e

Differentiating the optimal e directly with respect to b yields the response of educational investment to the per-child benefit:

$$\frac{de}{db} = -\frac{\beta\alpha}{(1-\beta\alpha)\,\tau^e\,y} \;<\; 0 \tag{3}$$

I examine how the education response to child benefits varies with household income. Differentiating with respect to y and simplifying yields:

$$\frac{d}{dy}\left(\frac{de}{db}\right) = \frac{d}{dy}\left(-\frac{\beta\alpha}{(1-\beta\alpha)\,\tau^e\,y}\right) = \frac{\beta\alpha}{(1-\beta\alpha)\,\tau^e\,y^2} \;>\; 0 \tag{4}$$

Hence, the effect on education is increasing in income, becoming less negative. The negative effect of child benefits on educational investment is larger in magnitude for low-income households.

B.3 The effect of b on n

The closed-form expression for the optimal fertility is

$$n = \frac{\gamma\,(1-\beta\alpha)\,(y+m)}{y\tau^q - b} \tag{5}$$

Differentiating (5) directly with respect to b,

$$\frac{\partial n}{\partial b} = \frac{\gamma\,(1-\beta\alpha)\,(y+m)}{(y\tau^q - b)^2} \;>\; 0 \tag{6}$$

To see how $\partial n/\partial b$ varies with income, differentiate (6) with respect to y:

$$\frac{d}{dy}\left(\frac{\partial n}{\partial b}\right) = \gamma(1-\beta\alpha)\cdot\frac{d}{dy}\left[\frac{y+m}{(y\tau^q-b)^2}\right] = \gamma(1-\beta\alpha)\cdot\frac{(y\tau^q-b)-2\tau^q(y+m)}{(y\tau^q-b)^3} \tag{7}$$

The denominator is strictly positive. The numerator equals

$$(y\tau^q - b) - 2\tau^q(y+m) \;=\; -y\tau^q - b - 2\tau^q m \;<\; 0 \tag{8}$$

Hence, the effect on fertility is decreasing in income.

B.4 The effect of b and m on labor supply

Both m and b affect parental labor supply, as they affect the total time devoted to raising children, $n(\tau^q + \tau^e e)$. Since m increases n, but does not affect e, unconditional child payments for existing children will increase the total time devoted to raising children. The impact of child benefit payments for new children is more nuanced, because e is a function of b. Substituting optimal fertility, I define the total time withdrawn from the labor market as:

$$L_R \;\equiv\; n\,(\tau^q + \tau^e e) \tag{9}$$

Substituting the closed-form solutions and simplifying,

$$L_R \;=\; \frac{\gamma\,(y+m)\,(\tau^q - \beta\alpha\, b/y)}{y\tau^q - b} \tag{10}$$

Differentiating (10) with respect to b using the quotient rule,

$$\frac{\partial L_R}{\partial b} = \frac{\gamma(y+m)}{(y\tau^q - b)^2}\left[-\frac{\beta\alpha}{y}\,(y\tau^q - b) + \tau^q - \frac{\beta\alpha\, b}{y}\right] \tag{11}$$

Simplifying the bracketed term:

$$-\frac{\beta\alpha}{y}(y\tau^q - b) + \tau^q - \frac{\beta\alpha\, b}{y} = -\beta\alpha\tau^q + \frac{\beta\alpha\, b}{y} + \tau^q - \frac{\beta\alpha\, b}{y} = \tau^q\,(1-\beta\alpha) \tag{12}$$

Hence, $\frac{\partial L_R}{\partial b} > 0$. The child benefit for not-yet-born children increases the total time withdrawn from the labor market. The introduction of the child benefit program should reduce parental labor supply.