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Abstract

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*We thank ..... , seminar participants at the ..... for useful suggestions. .....). All errors are ours.

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1 Introduction

1.1 The 2007 Parental Reform Benefits

2 Data and Methodology

2.1 Data

Our dataset is the German Socio-economic Panel (GSOEP). It includes subjective well-being question and information on the individual life history such as the career path, marital status, childhood biography, and social background.

The dependent variable is the life satisfaction question, which is considered as an indicator of individuals' subjective well-being. The life satisfaction question in the GSOEP asks: "How satisfied are you with your life, all things considered?", with responses given on a 0-10 scale, in which 0 is labelled "completely dissatisfied and 10 is labelled "completely satisfied. For the individual-level observed characteristics we control for age, age squared, marital status, education level, and employment status. As of the household-level observed characteristics household income quintiles, number of children (our main explanatory variable), and age group of the youngest child are our independent variables. Marital status is a dummy variable and takes 1 if the individual is in union (either married or cohabiting) and 0 otherwise. We collapse the education-levels into three broad groups *primary education*, *secondary education*, and *tertiary education*. For employment status we control for being employed, unemployed, and inactive. The calculation of income-quintile variable is based on "OECD equivalence scale income"[1].

In order to be included into our sample, the respondent must be female, older than 20 and younger than 50, and have reported control variables. All regressions includes a set of year dummies to allow for nonlinear time trends.

[1]Total household income is divided by the sum of the weightings to yield a representative income. OECD modified scale is 1.0 to the first adult, 0.5 to the second and each subsequent person aged 14 and over, and 0.3 to each child under aged 14.

3 Methodology

We are interested in estimating the causal effect of parental benefits improvement on the life satisfaction of women. More specifically, we focus on the average effect of the 2007 policy change in Germany for the women, who were actually exposed to the parental benefits improvement. We compare changes in life satisfaction for women who have a child (treated) and benefited from a potential extension in 2007 reform to changes in life satisfaction for individuals who don't have a child (control). We employ a difference in difference (DID) approach using the quasi-experimental framework provided by the 2007 reform.

Assume that the birth of a child is exogenously assigned to the treatment and control groups, the causal effect of reform on the life satisfaction could be identified by least squares estimation on the following DID specification:

$$Y_{it} = \alpha_1 C_{it} + \alpha_2 C_{it} \times reform_t + \alpha_3 \mathbf{x_{it}'} + v_t + u_{it} \tag{3.1}$$

where Y_{it} is a life satisfaction of the woman i at time t, C_{it} represents the number of child in the household for women i at time t, the variable $reform$ is a dummy that takes the value 1 starting of 2008 and zero otherwise, v_t are a set of year dummies.

The coefficient α_1 captures the permanent differences between the treated and controls. The interaction coefficient α_2 is the effect of interest because it captures the differential impact of increased parental benefits. We control for observed characteristics with the vector x_{it}, which contains the individual characteristics.

The key identifying assumption is that α_2 would be zero in the absence of the reform, on average and conditional on x_{it}, life satisfaction of women with and without children would have followed parallel trends in the absence of the reform. The unobserved determinants of life satisfaction of women for the treated and controls would have followed parallel trends had there been no exposure to the treatment. The identifying assumption implies that the linear DID can handle treatment endogeneity as long as the resulting bias has the same magnitude

before and after the refom and therefore can be differenced away [**?**, **?**].

A biggest threat to the identification strategy is the nonrandom sorting of women into fertility based on time variant unobservables might cause sorting bias to vary. If the resulting endogeneity bias is not constant in the pre and post reform period, it cannot be differenced away and the ATT will be biased. The IV-DID could be a solution to fix time variant endogeneity.

We instrument number of children in a given year with having a multiple birth. For the IV identification strategy, our instrument should be strongly correlated with number of children at time t but uncorrelated with the shock, namely the 2007 parental reform change. Our empirical analysis adopts the standard approach of exploiting multiple births as sources of exogenous variation in the number of children to identify the causal effect of an additional child for the 2007 reforms on life satisfaction of women.

Table-2 represents the results for the first stage regressions of the IV estimates to evaluate the strength of the instruments. Weak instrument concerns can be raised in the following three points: (i) if the instrument is only weakly correlated with the number of children, the correlation between the instrument and residuals in the equation 3.1 might induce larger inconsistency in the IV estimate than in the OLS-DID estimate; (ii) if the correlation between the instrument and the number of children nears zero, then finite sample bias of the IV estimate might be inflated; (3) weak instruments can generate inflated standard errors in the second stage and lead to loss of significance of the estimates [**?**].

4 Results

Table-1 shows the regression results of the equation 3.1. The regression estimates a positive average treatment effect of the reform that amounts to 0.019 standard deviation points. [Note: Explain columns separetely.]

As explained in the methodology section, OLS-DID can cope with the sorting bias if and only if it is constant pre and post reform period. We instrument both the number of children

and its interaction with the $reform$ dummy. Table-2 part A shows the results for multiple births and the part B reports the results for the interaction of multiple births with the reform dummy. The columns contain the same specifications as reported in Table-1. In the first stage regressions are always significant across all specifications, except for the specification with no regressors in column 1 part B. Moreover, F-statistics for the test in all columns that the coefficients of the exclusion restrictions are jointly zero are above the critical level of 10 [**?**]. In all, the first stage results show that the instruments are strong predictors of fertility behavior in a given year thus reassuring on the relevance of the chosen instruments.

Second stage estimates of the IV approach and results are represented in Table-3. Consistency of the IV method hinges on the assumption that multiple births are uncorrelated with the unobserved determinants of life satisfaction [Elaborate on that]. The main result is that the IV estimates are positive and somewhat larger than the OLS counterparts. The effects of the reform become stronger on the life satisfaction of woman than the OLS estimates and significant when we control for socio-economic characteristics [Later write about socio-econ changes].

In order to test if the OLS estimates are statistically different from the corresponding IV estimates we run a Hausman test. We report the results at the bottom of Table-3 and we can reject the null of exogeneity, which confirms the inconsistency of the OLS.

5 Sensitivity Analyses

1-number of delivery instead of number of child

2- fake year for the reform

3-whether the propensity to become pregnant changed after the reform

4 DID-semi parametric version [Abadie (2005)]

Table 1: OLS-DID

	(1)	(2)	(3)
Number of child	0.0562***	0.0637***	0.0562***
	(6.67)	(5.37)	(4.78)
Number of child × reform	0.0196	0.0134	0.0186
	(1.29)	(0.92)	(1.29)
Age		-0.122***	-0.127***
		(-15.34)	(-16.09)
Age2		0.00122***	0.00130***
		(11.14)	(11.95)
Union		0.413***	0.412***
		(24.48)	(24.53)
Primary Education		-0.175***	-0.248***
		(-8.56)	(-12.09)
Tertiary Education		0.238***	0.239***
		(14.55)	(14.69)
Working		1.157***	1.063***
		(39.98)	(36.65)
Inactive		0.982***	0.860***
		(30.66)	(26.74)
Log (equalised household income)		0.276***	0.257***
		(41.13)	(38.27)
Age of youngest kid 1 (no child)		-0.0380	-0.0272
		(-1.32)	(-0.95)
Age of youngest kid 2 (0-2 years old)		0.0435	0.0531
		(1.54)	(1.89)
Age of youngest kid 4 (6+)		-0.0230	-0.0253
		(-0.98)	(-1.08)
Time dummies	Yes	Yes	Yes
Region dummies	No	No	Yes
N	61860	61860	61860

Table 1: *, **, *** indicate the 10%, 5%, and 1% significance levels, respectively.

Table 2: First Stage Regressions

	(1)	(2)	(3)
A. Number of child			
Number of multiple births	0.880***	0.345***	0.338***
	(17.97)	(11.53)	(11.27)
Number of multiple births × reform	-0.0351	-0.0451	-0.0353
	(-0.40)	(-0.84)	(-0.66)
F-stat	322.97	132.99	126.99
B. Number of child × reform			
Number of multiple births	1.04e-13	-0.160***	-0.160***
	(0.00)	(-6.54)	(-6.53)
Number of multiple births × reform	0.845***	0.837***	0.838***
	(17.15)	(19.06)	(19.09)
F-stat	294.03	363.11	364.40
Time dummies	Yes	Yes	Yes
Socio-economic characteristics	No	Yes	Yes
Region dummies	No	No	Yes
N	61860	61860	61860

Table 2: *, **, *** indicate the 10%, 5%, and 1% significance levels, respectively.

Table 3: OLS-IV

	(1)	(2)	(3)
Number of child	0.0422	0.814***	0.629**
	(0.43)	(3.66)	(2.84)
Number of child × reform	0.218	0.471*	0.486**
	(1.20)	(2.55)	(2.69)
Age		-0.232***	-0.214***
		(-7.75)	(-7.22)
Age2		0.00279***	0.00254***
		(6.55)	(6.02)
Union		0.239***	0.274***
		(5.04)	(5.87)
Primary Education		-0.252***	-0.308***
		(-8.82)	(-11.15)
Tertiary Education		0.228***	0.228***
		(13.14)	(13.22)
Working		1.262***	1.154***
		(31.70)	(28.36)
Inactive		0.877***	0.788***
		(18.59)	(17.43)
Log (equalised household income)		0.216***	0.208***
		(13.84)	(13.59)
Age of youngest kid 1 (no child)		1.287***	1.042**
		(3.99)	(3.26)
Age of youngest kid 2 (0-2 years old)		0.178***	0.160***
		(3.95)	(3.62)
Age of youngest kid 4 (6+)		0.119**	0.0905*
		(2.86)	(2.20)
Time dummies	Yes	Yes	Yes
Region dummies	No	No	Yes
Wu-Hausman	0.742104	11.8776	8.990
p-value	0.4761	0.000	0.000
N	61860	61860	61860

Table 3: *, **, *** indicate the 10%, 5%, and 1% significance levels, respectively.