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DISCUSSION PAPER SERIES

IZA DP No. 16565

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ABSTRACT

Understanding the Impacts of Paid Maternity Leave on Women's Labor Market Outcomes*

All OECD countries except the United States offer at least four months of paid maternity leave, and the average duration of mandated paid maternity leave has increased steadily from 1970 to the present. There is some evidence that paid leave policies above a certain duration negatively impact women's labor market outcomes. In order to estimate the effects of paid leave, we link data on 40 years of paid leave policy across 24 European countries to survey data using a birth-cohort panel. Following previous work, we show that conventional fixed effects estimation suggests a non-monotonic relationship between leave length and women's labor force attachment, with leaves of three months or less increasing women's labor force attachment while longer leaves reduce it. However, in our context, the putative positive impacts of short-duration maternity leaves on women's employment appear to be driven by negative weighting in fixed effects estimation, which is explained by the fact that all countries in our sample eventually adopt short-duration leave policies. Using a robust imputation-based estimator, we find that maternity leaves longer than three months negatively affect female employment and increase women's domestic work burden. Leaves longer than six months also reduce women's educational attainment and their propensity to raise children.

JEL Classification: D13, J16, J22

Keywords: gender, parental leave, women's labor force participation, European social policy, fertility, two-way fixed effects

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1 Introduction

Women are less likely than men to participate in the labor force in 184 of 187 countries for which data is available (The World Bank, 2022), and they also typically receive lower wages than men for similar work (Waldfogel, 1998; Goldin and Mitchell, 2017). Childbearing is one of the main drivers of women's lower wages and labor force attachment (Bertrand, Goldin and Katz, 2010; Cortés and Pan, 2020). Women's earnings, hours, and wages decline after the birth of their first child and do not ever fully recover (Kleven, Landais, Posch, Steinhauer and Zweimüller, 2019a; Cortés and Pan, 2020). Factors that discourage high-ability women from participating in the labor force have efficiency implications: Hsieh, Hurst, Jones and Klenow (2019) argue that between 20 and 40 percent of US productivity growth between 1960 and 2010 can be attributed to the entry of women and minorities into high-skill occupations. Thus, policies that mitigate the child penalty and strengthen mothers' labor force attachment may be justified on both efficiency and equity grounds.

Maternity leave is one of the most widely adopted policies intended to allow women to combine career and family (Olivetti and Petrongolo, 2017; Kleven, Landais, Posch, Steinhauer and Zweimüller, 2020). 37 of the 38 OECD countries – all except the United States – guarantee working mothers at least four months of paid leave (Thévenon and Solaz, 2013). However, the empirical evidence on the impact of maternity leave policies on women's labor market outcomes is mixed. Cross-country comparisons by Ruhm (1998), Blau and Kahn (2013), and Olivetti and Petrongolo (2017) suggest that maternity leave can increase women's labor force participation and reduce gender gaps in employment, while a number of country case studies exploiting policy changes for causal identification have found null or negative impacts of maternity leave on women's labor market outcomes (Schönberg and Ludsteck, 2007; Lalive and Zweimüller, 2009; Lalive, Schlosser, Steinhauer and Zweimüller, 2013; Bailey, Byker, Patel and Ramnath, 2019; Kleven, Landais, Posch, Steinhauer and Zweimüller, 2020). Del Rey, Kyriacou and Silva (2021) argue that these findings can be reconciled if the impact of maternity leave is non-monotonic, with short-duration leaves improving women's labor market outcomes and longer leaves having negative impacts.

Combining country-level panel data on the length of paid leave available to mothers in 24 European countries with rich individual-level data from the European Social Survey (ESS), we estimate the impact of maternity leave on women's life trajectories.[1] We extend the existing

[1]The ESS collects data in both Israel and Turkey. We follow the ESS in referring to the set of countries

literature in two ways. First, we estimate the impact of the leave policy in place when a woman enters adulthood, building on work by Goldin and Katz (2002) and Kuziemko, Pan, Shen and Washington (2018) which highlights the importance of decision-making in early adulthood for subsequent career and family outcomes. We test whether the amount of paid maternity leave available when a woman turns 18 impacts her subsequent labor force attachment, educational investments, and family formation. Second, we incorporate insights from the recent literature on two-way fixed effects into the cross-country analysis of the impacts of parental leave policy. We replicate the S-shaped pattern of impacts found in Del Rey, Kyriacou and Silva (2021), which suggests that short leaves have positive impacts on women's labor force attachment while longer leaves have negative impacts. However, we show that this pattern can arise because two-way fixed effects analysis places negative weight on some treated country-years when evaluating policies like short-duration leaves that are eventually adopted by all countries in the sample. Using the alternative estimation approach suggested by Borusyak, Jaravel and Spiess (forthcoming), we show that the impacts of short leaves cannot be credibly estimated in our country-level panel. However, our results provide qualified evidence that leave durations longer than three months have negative impacts on women's labor force attachment and increase the likelihood that a woman reports spending time doing housework. In addition, we show that leave lengths longer than six months have negative impacts on a woman's educational attainment and on her likelihood of having ever had children in her household.

We contribute to large literatures on women's labor force participation, household specialization, the child penalty, and parental leave policies – much of which is reviewed in Goldin (2006), Goldin (2014), Olivetti and Petrongolo (2017), Kleven, Landais, Posch, Steinhauer and Zweimüller (2019a), Kleven, Landais, Posch, Steinhauer and Zweimüller (2020), and Cortés and Pan (2020). As discussed above, our work is most closely related to papers such as Ruhm (1998), Blau and Kahn (2013), Olivetti and Petrongolo (2017), and Del Rey, Kyriacou and Silva (2021) that estimate the impact of paid leave in cross-country contexts. This approach complements recent within-country studies such as Schönberg and Ludsteck (2007), Lalive and Zweimüller (2009), Lalive, Schlosser, Steinhauer and Zweimüller (2013), Bailey, Byker, Patel and Ramnath (2019), Kleven, Landais, Posch, Steinhauer and Zweimüller (2020). To date, most of the cross-country analysis of the impacts of paid maternity leave has focused on estimating contemporaneous effects on women who are having children when a particular policy is imple-

included in the data set as "European countries."

mented. Our work is also closely related to papers such as Goldin and Katz (2002), Kuziemko, Pan, Shen and Washington (2018), Olivetti, Patacchini and Zenou (2020), and Kleven, Landais, Posch, Steinhauer and Zweimüller (2019a) which emphasize the role of experiences in adolescence and early adulthood in shaping long-run career and family outcomes. We incorporate this life-cycle perspective into the cross-country analysis of maternity leave policy.

From a methodological perspective, we contribute to the growing body of empirical work incorporating the insights from recent analysis of two-way fixed effects. De Chaisemartin and d'Haultfoeuille (2020), Goodman-Bacon (2021), Callaway, Goodman-Bacon and Sant'Anna (2021), Jakiela (2021), Borusyak, Jaravel and Spiess (forthcoming), Roth, Sant'Anna, Bilinski and Poe (2023) show that two-way fixed effects estimates of policy impacts can be severely biased when policies are implemented in different locations at different times. We incorporate the insights from this recent literature, and show that negative weights may be substantively important in the cross-country analysis of the impacts of maternity leave policy.

The rest of this paper is organized as follows. Section 2 describes our data sources and gives an overview of the evolution of maternity leave policies in Europe. Section 3 presents our empirical results, and Section 4 concludes.

2 Research Design and Data

2.1 Paid Maternity Leave in Europe

Data on paid maternity leave comes from the OECD Family Database, a collection of 70 cross-national indicators of family policies in OECD countries, covering the years 1970-2021. Our main independent variable is the amount of paid parental leave (measured in years) available to working women who give birth in a given country and year.[2]

The length of paid leave available to European mothers has increased since the 1970s, as shown in Figure 1 and Table A1. Though several European countries first implemented maternity leave policies in the nineteenth century (Ruhm, 1998; Olivetti and Petrongolo, 2017), only Austria guaranteed mothers more than six months of paid parental leave as of 1970, and Iceland, Ireland, and Switzerland did not yet offer mothers any guaranteed paid leave. Appendix Table A1 shows that every European country in our sample increased the length of paid leave available to mothers between 1970 and 2010; the mean length of paid leave increased by more

[2]Paid maternity leave is the total number of weeks of paid maternity and/or parental leave available to mothers.

than 8 months, and the median increased by 7 months.

Figure 1 demonstrates that broad cross-country patterns of variation in leave policy have remained relatively constant over time. Iceland, Ireland, and Switzerland offered no paid leave in 1970, and in 2010 they were in the bottom third of countries in our sample in terms of the length of guaranteed paid leave offered to mothers. In contrast, Austria, Czechia, Slovakia, and Sweden were the only four countries in our sample that guaranteed at least six months of leave in 1970, and in 2010 they all offered more than a year of guaranteed paid leave. Within our sample, the country-level correlation between the length of paid leave offered in 1970 and the length of paid leave offered in 2010 is 0.45.

Different countries implement maternity leave policies for different reasons. As discussed in Ruhm (1998) and Olivetti and Petrongolo (2017), many early leave policies were enacted to protect women's physical health and to encourage women to stay home with their young children. A number of communist countries including Czechia, Slovakia, and Hungary expanded paid family leave rapidly in the 1980s in an attempt to address concerns about low birth rates.[3] In 2010, these three countries were the only ones in our sample that offered more than two years of paid maternity leave. Similarly, the 2006 increase in French paid leave was part of a national campaign to encourage women to have larger families (Moore, 2006). To the extent that long periods of paid leave are intended to increase fertility, they might be expected to weaken women's labor force attachment.

However, other countries have expanded paid leave to encourage women's equality and facilitate the labor force participation of mothers. For example, Sweden's Equal Opportunities Act of 1980 reinforced the sentiment of gender equality in the workplace by removing the term "maternity leave" from their policies and replacing it with the more inclusive "parental leave" (Thévenon and Solaz, 2013).[4]

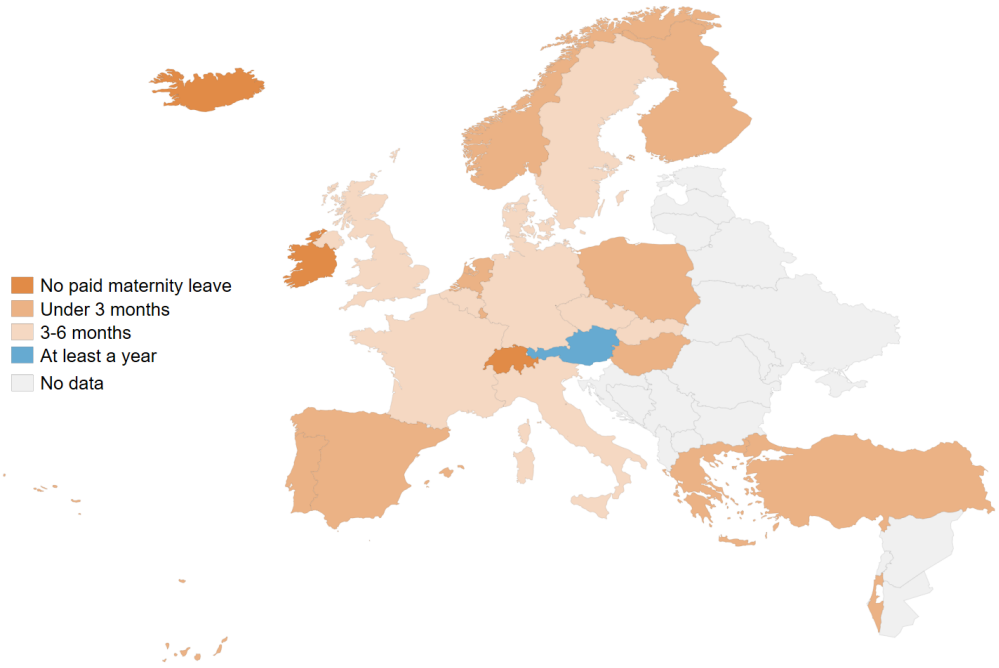
Figure 2 characterizes the duration of paid maternity leave in eight European countries, highlighting the spatial and temporal variation in leave length among countries in our sample. The figure highlights several important facts. First, though every country in our sample offered more maternity leave in 2010 than in 1970, leave lengths have not increased monotonically in all countries. Austria, Czechia, and Germany, for example, all guaranteed almost a year less

[3] A newspaper article from 1973 describes this trend, saying: "Along with tighter restrictions on abortions and, in some countries, restrictions on birth control devices, most of the Eastern European governments have substantially increased their maternity benefits, hoping to urge more women to have children" (Prinz, 1973).

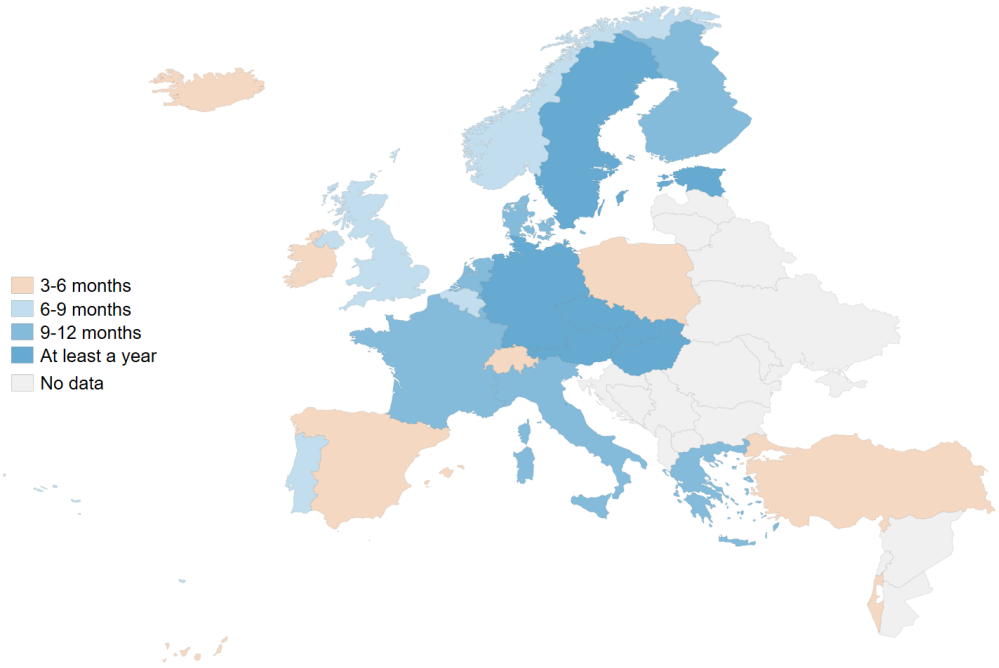
[4] In 2011, nine out of ten fathers took advantage of this parental leave policy (Duvander, Haas and Thalberg, 2017).

Figure 1: Paid Leave Policies in Europe in 1970 and 2010

Panel A: 1970



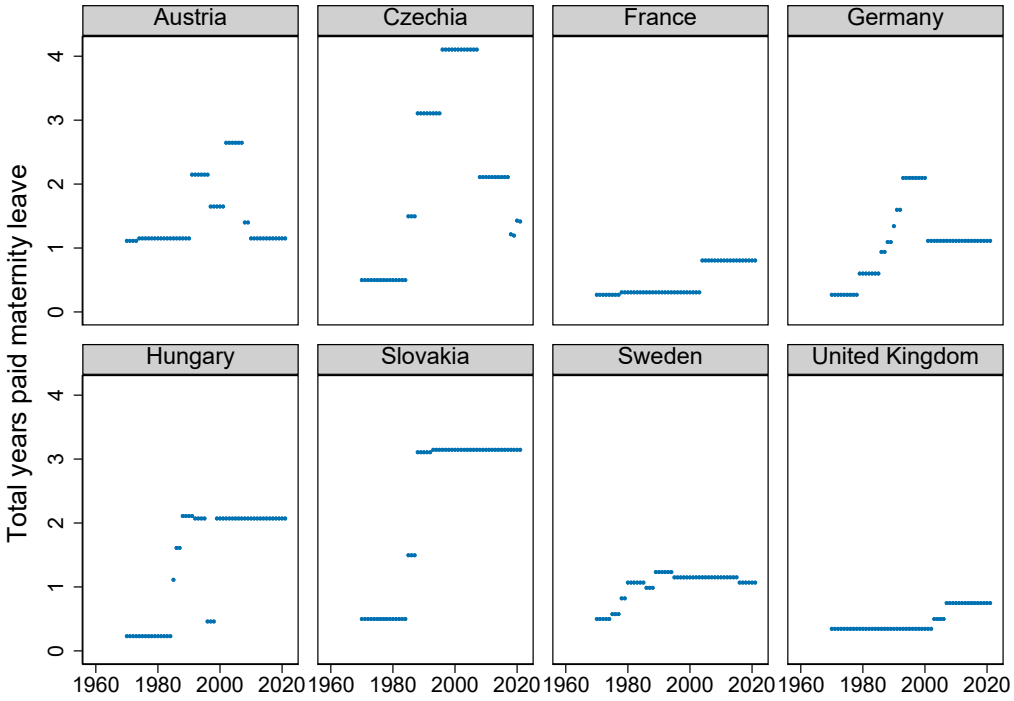
Panel B: 2010



Data on the duration of paid maternity and/or parental leave available to all working mothers comes from the OECD Family Database.

paid maternity leave in 2010 than they did in 1995. Second, many countries offer guaranteed leaves of very long duration – for example, Czechia and Hungary guaranteed more than two years of leave in 2010 while Slovakia guaranteed more than three years. This contrasts with Sweden, which implemented leave policy with the explicit aim of promoting women's equality (as discussed above) and never offered more than fifteen months of leave.

Figure 2: The Duration of Paid Maternity Leave for Select Countries



Data on the duration of paid maternity and/or parental leave available to all working mothers comes from the OECD Family Database.

The fact that policymakers implement maternity leave policy with different aims – in some cases seeking to increase fertility or encourage women to remain at home with their young children, and in other cases seeking to enhance gender equality in the workplace – suggests the possibility of countervailing effects on women's labor force outcomes. As discussed in Olivetti and Petrongolo (2017) and Del Rey, Kyriacou and Silva (2021), the impact of maternity leave may be non-monotonic, with short leaves increasing women's labor force participation while longer leaves discourage it.

2.2 Data on Women in Europe

Outcome data comes from the European Social Survey (ESS), a cross-national survey conducted every two years in up to 32 European countries. In each of the ten rounds since 2002, a representative sample of respondents was drawn in every participating country. We consider six binary outcomes that are included in all ESS rounds and capture important aspects of women's personal and professional lives: whether a woman is currently working, whether she has ever worked, whether she reports doing housework or childcare, whether she has ever been married, whether she has ever had children in her household (either her own or those of a partner), and whether she attended college or attained any form of tertiary education.

As previously discussed, we follow Goldin and Katz (2002) in viewing early adulthood as a crucial juncture for education, fertility, and labor force participation decisions. We construct a country by birth cohort panel linking each woman in the ESS sample to the maternity leave policy in place in her country when she was 18 years old. We restrict the sample to women between the ages of 25 and 60, excluding women who are not native-born citizens of their country of residence. This leaves us with a sample of 82,867 women born between 1952 and 1996 from 24 European countries, drawn from ten survey rounds and interviewed between 2002 and 2020.

Table 1 presents summary statistics for our sample. The average age among women in our sample is 42, and the average level of educational attainment is slightly more than high school. 95 percent of the women in our sample have worked for pay at some point in their lives, 73 percent were working at the time they were surveyed, 60 percent were married when surveyed, and 77 percent have had children in their households (either their own or those of a partner) at some point. 31 percent of respondents reported spending time on housework or childcare in the week prior to the survey. Across all women in our sample, the average length of paid maternity leave available when a women turned 18 is 0.67 years, but ranges from zero to over four years.

3 Results

3.1 Empirical Strategy

We exploit spatial and temporal variation in the length of paid leave available to mothers across European countries to estimate the impact of access to maternity leave on women's life

Table 1: Individual-level Summary Statistics for Women in the Sample

	Mean	SD	Min.	Max.	N
Age	41.89	9.59	25	60	82,867
Years of education	13.49	3.74	0	20	82,867
Currently enrolled in school	0.04	0.20	0	1	82,867
Higher education	0.58	0.49	0	1	82,867
Currently married	0.60	0.49	0	1	82,867
Never married	0.24	0.43	0	1	82,867
Currently employed	0.73	0.44	0	1	82,867
Ever employed	0.95	0.22	0	1	82,867
Unemployed	0.05	0.22	0	1	82,867
Out of labor force	0.02	0.15	0	1	82,867
Reports doing housework	0.31	0.46	0	1	82,867
Ever had children in household	0.77	0.42	0	1	82,867
Number of children in household	1.16	1.17	0	12	82,867
Years of paid maternity leave available at age 18	0.67	0.80	0	4.10	82,867

All variables except Years of paid maternity leave from rounds 1-10 of the European Social Survey. Our sample includes only female ESS respondents aged 25 to 60 at the time of the survey. Women with missing data on age, educational attainment, household composition, or employment status are excluded from the sample, as are women who are not native-born citizens of their current country of residence. Years of paid maternity leave comes from linking the OECD family database to our sample of ESS respondents.

trajectories. Our benchmark empirical specification is:

$$Y_{ijck} = \alpha + \beta L^a_{ijck} + \theta X_{ijck} + \nu_j + \gamma_c + \mu_k + \epsilon_{ijck} \tag{1}$$

where Y_{ijck} is an outcome for woman i born in year j in country c and interviewed in ESS round k, L^a_{ijck} represents the length of guaranteed paid leave that was available to mothers in country c when woman i born in year j was a years old, X_{ijck} is a vector of individual controls, ν_j is a vector of birth cohort fixed effects, γ_c is a vector of country fixed effects, μ_k is a vector of survey round fixed effects, and ϵ_{ijck} is a conditionally-mean-zero error term. Our primary independent variable of interest, L^{18}_{ijck}, is the length of paid leave available in a woman's country when she turned 18, at the point when she began making important independent decisions about human capital and fertility.

Our empirical strategy assumes that exposure to paid leave is plausibly exogenous conditional on birth cohort, country, and survey round (or, equivalently, age-at-survey) fixed effects. However, even when this identification assumption is satisfied, there are two important sources of misspecification that need to be considered. The first concern is that the impact of paid maternity leave may not be linear in leave length. As discussed above, several existing studies suggest that relatively long periods of leave may reduce women's labor force attachment and wages (Kleven, Landais, Posch, Steinhauer and Zweimüller, 2020; Del Rey, Kyriacou and Silva, 2021). If the impact of leave is non-monotonic in leave length, linear regression may not adequately capture the impact of introducing paid leave, or of a marginal increase in the length of leave at different points in the observed distribution (Callaway, Goodman-Bacon and Sant'Anna, 2021). We address this potential source of misspecification in two ways. First, we present a robustness check in which leave lengths are top-coded at one year. Top-coding effectively pools all leave lengths of a year or more. If excessively long leaves have negative impacts on women's labor force attachment, but the impact of leave is positive over most of the range, then topcoding should increase our estimates of the (positive) impact of leave on outcomes of interest. Second, we (separately) estimate the impact of having at least three, at least four, at least five, etc. months of leave – dichotomizing our continuous treatment (length of paid leave) into a series of binary treatments, thereby eliminating the potential for misspecification of the dose-response relationship. These approaches guarantee that our results are not driven by the assumption that the impact of paid leave is a linear function of leave length.

Even with a dichotomous treatment, fixed effects regressions may be misspecified when treatment timing is "staggered" (i.e. when leave policies are adopted by different countries at different times). In such contexts, linear fixed effects estimation weights different treated observations differently, and some treated observations may receive negative weight in the calculation of the estimated treatment effect (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Jakiela, 2021; Roth, Sant'Anna, Bilinski and Poe, 2023). Negative weights are a particular concern when all or most panel units (in this case, countries) eventually implement the treatment, and when the treatment effect changes over time. Most countries in our sample offered at least six months of paid maternity leave by 2010. Thus, negative weights are a concern in our setting, and the absence of a substantial "never treated" group makes fixed effects estimation of the impact of relatively short leaves particularly challenging. We address the issue by, first, assessing the extent to which treated observations are receiving negative weight in our fixed effects estimation and, second, comparing OLS results to those obtained using an imputation-based estimator proposed by Borusyak, Jaravel and Spiess (forthcoming).

3.2 Results

3.2.1 Paid Leave Length as a Continuous Treatment

Table 2 presents OLS estimates of the impact of paid maternity leave on our two labor market outcomes: whether a woman is currently working (Columns 1 and 2) and whether a woman has ever worked outside the home (Columns 3 and 4). Results (in Panel A, without top-coding of the leave variable) suggest that having a year of paid maternity leave available by the time a woman reaches adulthood reduces the likelihood that she is working by between 2.0 and 3.3 percentage points (Columns 1 and 2) and reduces the likelihood that a woman has ever worked by between 1.0 and 1.4 percentage points (Columns 3 and 4).[5] When we top-code leave length at one year (in Panel B of Table 2), OLS estimates suggest even larger negative impacts of leave on women's labor force participation. A comparison of Panels A and B is instructive. Both sets of coefficient estimates suggest that paid maternity leave has a negative and statistically significant impact on women's employment. However, the results from Panel B (with top-coding) are considerably larger (i.e. more negative) than those in Panel A (without top-coding). If the negative regression coefficients in Panel A were explained by large negative impacts of

[5]The magnitude of the estimated impact per additional year of paid leave is less than half of the seven percent decrease in employment found by Bailey et al. (2019) in their paper about California's Paid Family Leave Act.

excessively long leaves, we would expect to observe the opposite pattern.

Table 2: The Impacts of Access to Paid Maternity Leave On Women's Labor Market Outcomes

	Currently working		Ever worked	
	(1)	(2)	(3)	(4)
Panel A. Continuous Variation in Leave Length (in Years)				
Paid maternity leave	-0.0324***	-0.0209***	-0.0139***	-0.0101**
	(0.00870)	(0.00736)	(0.00454)	(0.00396)
Constant	0.689***	0.395***	0.971***	0.874***
	(0.0236)	(0.0345)	(0.0105)	(0.0230)
Panel B. Leave Length Top-Coded at One Year				
Paid maternity leave	-0.107**	-0.0791*	-0.0346**	-0.0254*
	(0.0434)	(0.0402)	(0.0156)	(0.0134)
Constant	0.741***	0.436***	0.984***	0.883***
	(0.0415)	(0.0489)	(0.0114)	(0.0218)
Observations	82,867	82,867	82,867	82,867
R-squared	0.072	0.110	0.214	0.233
Country FE	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

*p<0.1; **p<.05; ***p<.01. Standard errors clustered at country level in parentheses. Independent variable PAID MATERNITY LEAVE indicates the length of paid maternity leave (measured in years) available in a woman's country of birth during the year she turned 18. All specifications include country, birth year, and ESS round fixed effects. Controls included in Columns 2 and 4: years of education the respondent has completed, whether or not they are married, and the education levels of both their father and mother. CURRENTLY WORKING is an indicator for doing paid work at the time of the survey. EVER WORKED is an indicator for ever having worked for pay outside the home.

Table 3 reports estimates of the effect of paid maternity leave on non-labor outcomes: whether a woman obtained any education beyond high school (Columns 1 and 2), is married (Columns 3 and 4), ever had children in her household (Columns 5 and 6), and did housework or childcare at home in the week prior to the survey (Columns 7 and 8). Again, Panel A reports results without top-coding of our independent variable of interest, while Panel B reports results with top-coding. We find evidence that paid leave causes women to decrease their educational attainment and spend more time on domestic tasks. Coefficient estimates suggest that a year of paid leave decreases the likelihood that a female respondent will attain any level of higher education by between 2.8 and 4.3 percentage points and increases the likelihood that she spent

time on housework or childcare in the week prior to the survey by between 3.7 and 4.5 percentage points (Columns 7 and 8). The overall pattern of results is similar when we top-code leave length at 12 months (in Panel B), though (again) the magnitude of the estimates in Panel B are substantially larger than those in Panel A.

3.3 Different Lengths of Leave

Tables 2 and 3 aggregate the effect of paid leave without explicitly accounting for the fact that different paid leave durations might affect employment outcomes differently. To address this, we use a suite of indicator variables for whether or not the length of guaranteed paid leave exceeds different thresholds. Panel A of Figure 3 presents estimated regression coefficients and confidence intervals, summarizing the impact of having at least X months of paid leave on the likelihood that a woman is working, where X varies from 0 to 12. For leave lengths of three months or less, regression estimates suggest a positive impact of paid leave on employment. In contrast, results suggest that leave lengths of between six and 12 months lead to statistically significant decreases in the likelihood of that a woman is working. Thus, our results replicate the broad pattern observed in Del Rey, Kyriacou and Silva (2021), where short leave increases women's labor force participation while longer leaves have the opposite effect.

3.4 Negative Weights

As discussed above, recent literature on two-way fixed effects estimation highlights the potential for misspecification in designs such as ours. When all or most units eventually receive treatment, some treated units may receive negative weight in the calculation of the estimated treatment effect. Intuitively, OLS involves weighting each observation so as to minimize the variance of the resulting coefficient estimates; placing negative weight on some treated observations is optimal when the treatment effect is homogeneous. However, when treatment effects are heterogeneous, fixed effects estimates may be biased. As discussed in Goodman-Bacon (2021) and Borusyak, Jaravel and Spiess (forthcoming), the bias reflects the fact that fixed estimators involve some "forbidden comparisons" which use already treated units to estimate the counterfactual time trend; when the impact of treatment varies over time, already treated units cannot be used to estimate underlying time trends in the absence of treatment, leading to biased estimates of the average treatment effect.

Table 3: The Impacts of Access to Paid Maternity Leave On Women's Other Life Decisions

	Higher education		Married		Ever had kids		Doing housework	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Continuous Variation in Leave Length (in Years)								
Paid maternity leave	-0.0425***	-0.0283**	0.0159	0.0140	-0.00289	-0.0139*	0.0441***	0.0378***
	(0.0107)	(0.0117)	(0.0132)	(0.0130)	(0.00995)	(0.00730)	(0.0107)	(0.00888)
Constant	0.304***	0.00211	0.599***	0.642***	0.787***	0.796***	0.315***	0.331***
	(0.0188)	(0.0274)	(0.0185)	(0.0277)	(0.0152)	(0.0274)	(0.0327)	(0.0409)
Panel B. Leave Length Top-Coded at One Year								
Paid maternity leave	-0.109**	-0.0978*	-0.0178	-0.0207	-0.0228	-0.0326	0.106**	0.0986**
	(0.0498)	(0.0477)	(0.0474)	(0.0465)	(0.0326)	(0.0248)	(0.0449)	(0.0404)
Constant	0.346***	0.0500	0.632***	0.676***	0.803***	0.806***	0.277***	0.294***
	(0.0469)	(0.0374)	(0.0396)	(0.0408)	(0.0270)	(0.0325)	(0.0511)	(0.0550)
Observations	82,867	82,867	82,867	82,867	82,867	82,867	82,867	82,867
R-squared	0.142	0.210	0.068	0.070	0.131	0.241	0.090	0.118
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-Level Controls	No	Yes	No	Yes	No	Yes	No	Yes

*p<0.1; **p<.05; ***p<.01. Standard errors clustered at country level in parentheses. Independent variable PAID MATERNITY LEAVE indicates the length of paid maternity leave (measured in years) available in a woman's country of birth during the year she turned 18. All specifications include country, birth year, and ESS round fixed effects. The baseline specification include controls for whether or not a respondent is married, the education levels of both their father and mother, and the years of education a respondent has completed. Controls which are colinear with the outcome are removed from the equation. MARRIED is an indicator for whether or not the respondent is currently married. EVER HAD KIDS is an indicator for ever having kids in the household. DOING HOUSEWORK is an indicator for having spent time in the last week doing housework or caring for children.

The extent to which treated units receive negative weight in fixed effects estimation provides a summary measure of the use of forbidden comparisons and the resulting risk of bias. We characterize the extent of negative weighting in Panel B of Figure 3. The figure illustrates that all of our specifications involve some negative weighting of treated observations, and more than 60 percent of treated observations receive negative weight in the estimation of the impact of having at least 0, 1, and 2 months of paid leave. This suggests that traditional fixed effects estimators of the impact of paid maternity leave should be treated with caution, particularly when evaluating the impacts of short-duration leaves.

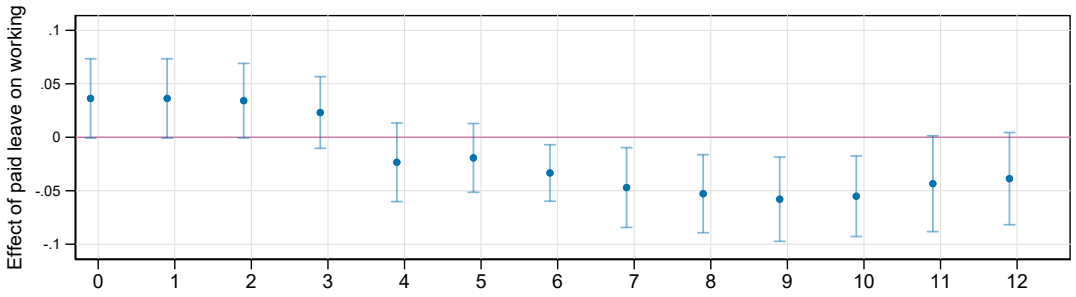
3.5 Robust Estimation

To address these specification issues, we make use of the robust estimator introduced by Borusyak, Jaravel and Spiess (forthcoming). This estimation procedure uses an imputation approach to estimate counterfactual outcomes for treated observations, calculating birth cohort and country fixed effects using only untreated observations. This strategy omits always-treated cohorts and countries from the analysis because it is impossible to estimate counterfactual outcomes for these observations (using their imputation approach). In our context, Iceland, Ireland, and Switzerland are the only countries in our sample that did not offer at least two months of paid maternity leave in 1970, so the estimation of the impacts of 0, 1, and 2-month leaves uses only data from those three countries (because they are the only countries that are not-yet-treated at the start of the panel). Panel C of Figure 3 displays the proportion of observations that are used in the analysis when implementing the Borusyak, Jaravel and Spiess (forthcoming) estimator. It suggests that estimates of the impacts of 0, 1, and 2 months of leave should be treated with extreme caution: the estimation omits more than 88 percent of the data and only uses data from three countries (Iceland, Ireland, and Switzerland, as discussed above). Using such a small and selected sample raises issues with generalizability, and suggests that clustered standard errors will yield tests that are incorrectly sized. In contrast, the analysis of the impact of having three months of leave uses 54 percent of the data and includes data from 14 countries, while the analysis of the impact of having four months of leave uses 76 percent of the data and includes observations from 19 countries. Estimation of the impacts of leave lengths of at least six months always uses more than 95 percent of the data, and includes observations from all countries except Austria.

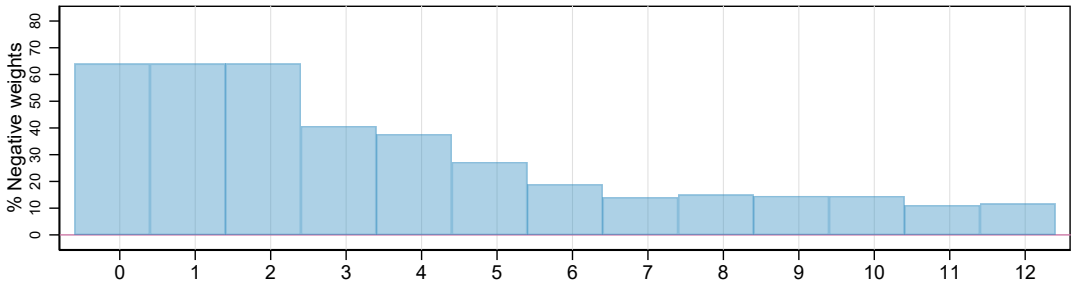
Figures 4 and 5 replicate Figure 3 for all outcomes of interest and allow for comparison

Figure 3: Regression Estimates and Negative Weighting

Panel A: OLS estimates



Panel B: Negative weighting



Panel C: Observations used in robust estimation

Panel A presents regression coefficients and confidence intervals from OLS regressions of the CURRENTLY WORKING variable on indicators for guaranteeing at least 1, 2, 3. etc., months of paid maternity leave, respectively, conditional on country, birth cohort, and survey round fixed effects. Panel B shows the proportion of treated observations in the sample that receive negative weight in fixed effects estimation of the regression from Panel A. Panel C shows what fraction of the data can be used in for the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming); the imputation-based approach omits countries and years that show no variation in the independent variable of interest.

of traditional OLS (fixed effects) estimates with Borusyak, Jaravel and Spiess (forthcoming)'s robust estimator. Because estimates of the impact of 0, 1, and 2 months of leave are based on a small and highly selected sample (leading to tests that are likely to be incorrectly sized), we shade those estimates in the figures. Both OLS and the Borusyak, Jaravel and Spiess (forthcoming) estimates indicate that relatively long paid maternity leaves decrease the likelihood that women are working.[6] The Borusyak, Jaravel and Spiess (forthcoming) estimates point to more pronounced effects than conventional OLS, and in particular suggest that paid maternity leaves of four months or longer reduce women's labor force participation. The Borusyak, Jaravel and Spiess (forthcoming) estimates also suggest that having a leave length of three months or longer in place when a woman turns eighteen reduces the likelihood that she ever works, though the impact is relatively small in magnitude. Paid leaves of three months or longer also have positive impacts on the likelihood that a woman reports doing housework in the week prior to the survey as well as negative impacts on the likelihood that a woman ever had children living in her home. Finally, results suggest that leave lengths of six months or longer have negative and statistically significant impacts on the likelihood that women obtain tertiary education.

3.6 The Timing of Impacts

In Figure 6, we replicate the specification from the first panel of Figure 4, which estimates the impact of paid leave on the likelihood that a woman is currently working. Here, we hold constant the length of leave, focusing on estimating the impact of offering at least six months of paid maternity leave; we instead vary the year the policy came into effect. Panel A plots the estimated impact of offering at least six months of paid leave by the time a woman turned X years old, where we allow X to vary from 5 to 30. Panel B repeats this specification with a twelve-month paid leave indicator. Offering at least six months of paid leave by the time a woman has children will impact her ability to take leave after giving birth, whereas offering leave earlier in life may also impact her decisions about educational attainment, occupational choice, and marriage (as discussed above) as well as the career and family trajectories of her slightly older peers (Olivetti, Patacchini and Zenou, 2020).

The vertical dashed line in Figure 6 reflects the critical age of 18 that we use for specifications

[6]To rule out the possibility that differences between the Borusyak, Jaravel and Spiess (forthcoming) estimator results and OLS results are driven by changes in sample composition, Figure A1 compares Borusyak, Jaravel and Spiess (forthcoming) estimates using the full sample with Borusyak, Jaravel and Spiess (forthcoming) estimates computed using only the sample employed in the estimation of the impact of three-month leaves. Resulting estimates are largely unchanged.

Figure 4: The Impacts of Paid Leave On Women's Labor Force Participation

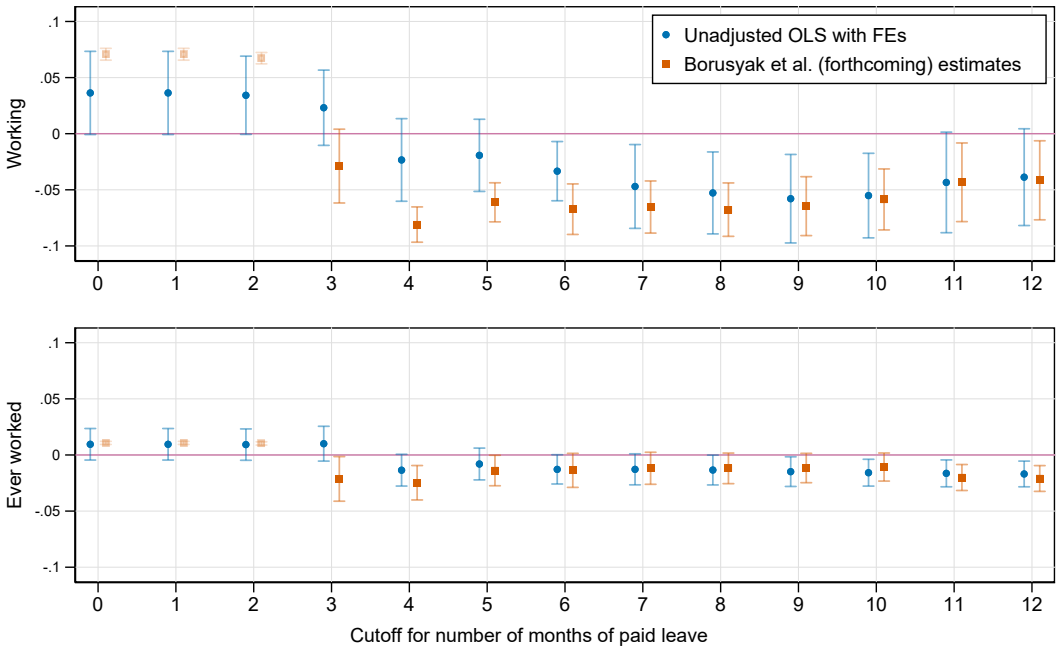


Figure presents regression coefficients and confidence intervals from OLS regressions of the Currently Working (top panel) and Ever Worked (bottom panel) variables on indicators for guaranteeing at least 1, 2, 3. etc., months of paid maternity leave, respectively, conditional on country, birth cohort, and survey round fixed effects. The figures compare traditional OLS to the the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming); the imputation-based approach omits countries and years that show no variation in the independent variable of interest.

Figure 5: The Impacts of Paid Leave On Women's Other Life Outcomes

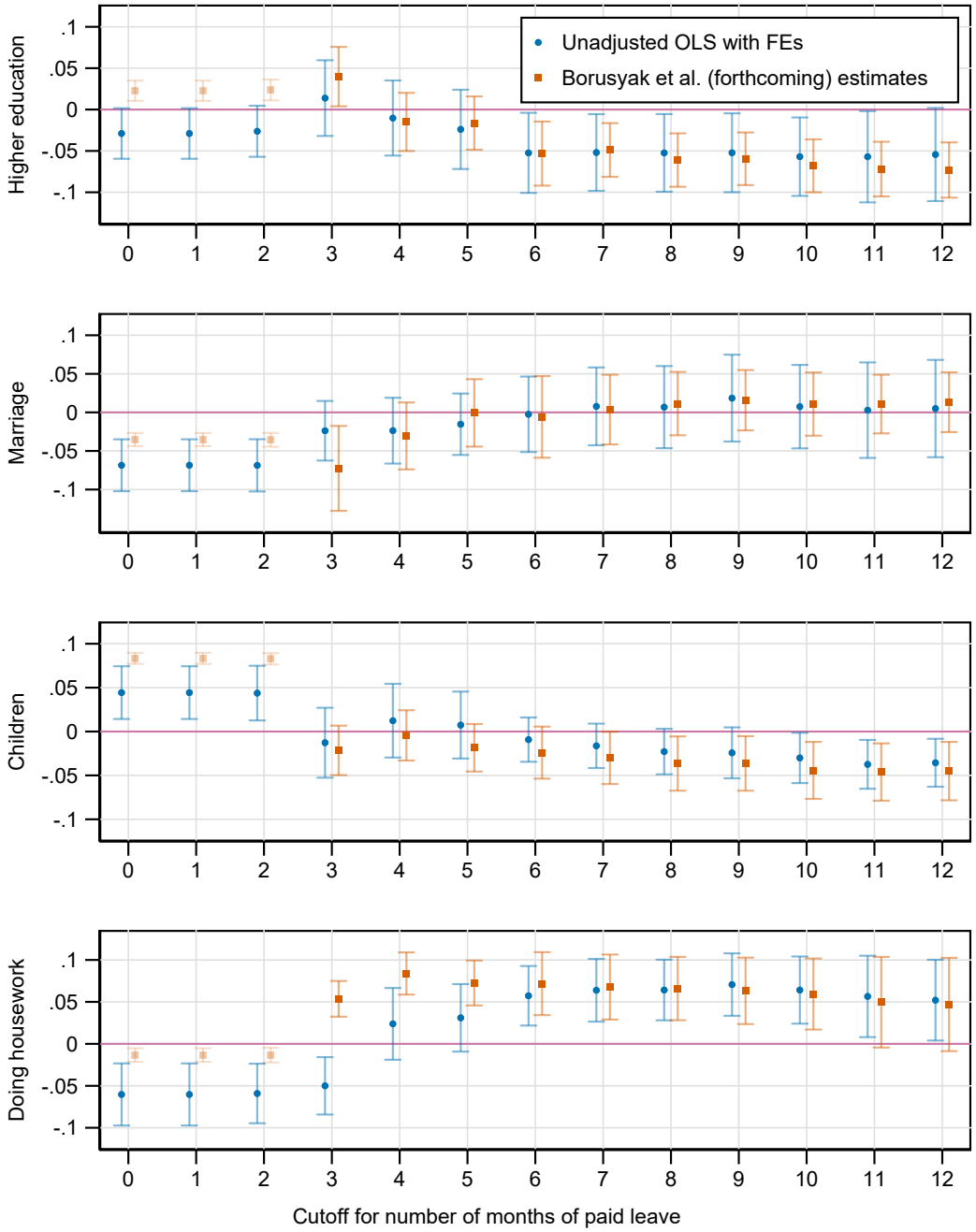
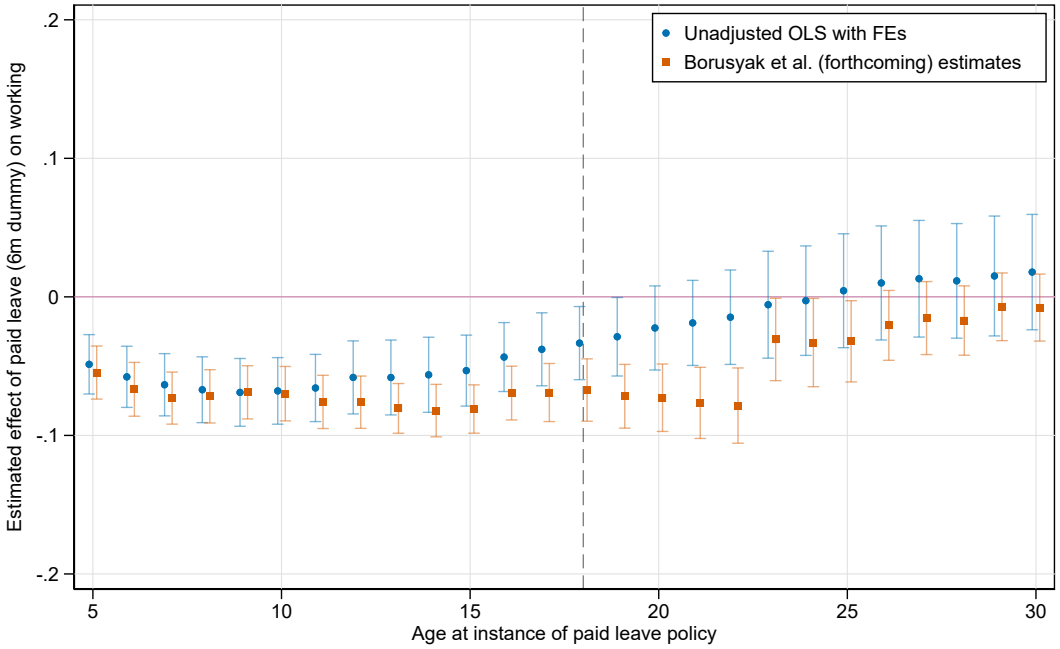


Figure presents regression coefficients and confidence intervals from OLS regressions of the Higher Education (top panel), Currently Married (second panel), Ever Had Children in the Household (third panel), and Doing Housework (bottom panel) variables on indicators for guaranteeing at least 1, 2, 3. etc., months of paid maternity leave, respectively, conditional on country, birth cohort, and survey round fixed effects. The figures compare traditional OLS to the the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming); the imputation-based approach omits countries and years that show no variation in the independent variable of interest.

Figure 6: The Impacts of Paid Leave on Decisions Across the Life Cycle

Panel A: At least 6 months of paid leave



Panel B: At least 12 months of paid leave

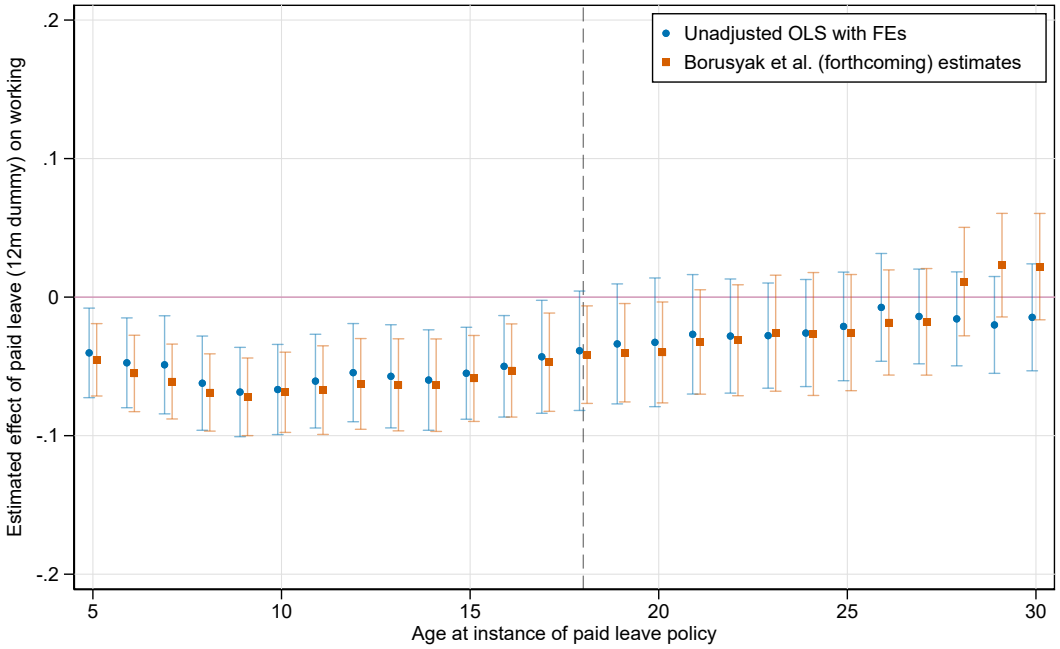


Figure presents regression coefficients and confidence intervals from OLS regressions of the Currently Working variables on indicators for guaranteeing at least 6 (top panel) or 12 (bottom panel) months of paid maternity leave, conditional on country, birth cohort, and survey round fixed effects. Both panels show estimates varying the age at which a policy must have taken effect in order for us to count a women as treated. The figures compare traditional OLS to the the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming); the imputation-based approach omits countries and years that show no variation in the independent variable of interest.

earlier in the paper, at which point we see in Panel A that paid leave policies longer than 6 months are associated with a 7 percent decrease in female employment. Both the OLS and Borusyak, Jaravel and Spiess (forthcoming) coefficient estimates show a decrease in magnitude and significance at older decision-point ages. This pattern supports the idea that paid leave policies impact women before they actually begin having children. Point estimates indicate that offering six months of leave after a woman turns 25 does not impact her likelihood of working, suggesting that women of those ages are no longer in a critical period for employment decisions and they are not as influenced by contemporaneous changes in paid leave policy as younger women. Our estimates also suggest that the leave policy in place when a woman is a child matters, possibly because young girls and adolescents are influenced by the employment and leave-taking behaviors of older women in their surrounding environments. Normative gendered behavior at home and in the workplace is socialized at a very young age (Olivetti, Patacchini and Zenou, 2020; Kleven, Landais and Sögaard, 2019b), and the increased presence of women at home taking care of children could impact girls' perception of their future role in a family environment. This suggests a potential intergenerational impact of paid leave policy.

3.7 Falsification Tests

Our fixed effects estimation assumes that treated and untreated countries – i.e. those that do and do not implement a particular maternity leave policy – would be on similar trajectories in the absence of treatment. While this assumption cannot be tested directly, we assess its validity by examining the relationship between parental education and the leave policy in place when a respondent was 18. Since respondents' parents made their education decisions before their children turned 18 (in almost all cases), we expect to find no significant effect of paid leave policy on parental education. Online Appendix Table A2 presents the results for regressing the level of education of a respondent's mother and father on the length of paid maternal leave in her country when she was 18. Reassuringly, the point estimates are insignificant.

To further test our identification strategy, we examine the association between our set of dichotomous treatment variables (for three, four, five, etc. months of paid leave) with parental education using both conventional OLS and the robust estimator proposed by Borusyak, Jaravel and Spiess (forthcoming). Results are presented in Online Appendix Figure A2. We find no evidence of a statistically significant association between fathers' education and the maternity leave policy in place when a woman turns 18. However, results on mother's education are mixed.

While conventional OLS does not suggest a link with maternal education, analysis using the Borusyak, Jaravel and Spiess (forthcoming) estimates indicates that leave lengths of four, five, and six months are associated with mothers' education (though longer leaves are not). These results suggest that our estimates of the impacts of four to six-month leaves should be viewed with some caution. Given the many social, political, and economic changes occurring during our period of study, all quasi-experimental studies relying on cross-country or cross-state variation in government policy should perhaps be viewed with some degree of skepticism, and our results are no different.

4 Conclusion

Using policy data for 24 European countries across 50 years, we estimate the effect of paid maternity leave policy on both labor-related and non-labor outcomes for a large sample of women. By linking these women to the paid leave policies in place when they were 18 years old, we capture the long-run impacts of changing policy at a critical decision-making point on outcomes over a woman's entire working life. We find that paid leave durations longer than four months negatively impact women's lifetime labor force attachment and positively impact the probability that a woman will be doing housework.

Our empirical strategy relies on spatial and temporal fixed effects, and these approaches can lead to biased estimates of treatment effects because countries phase in leave policies at different times. We show that the issue of negative weighting is a serious problem when evaluating short leaves in particular, because all countries in our sample eventually implemented at least some paid maternity leave. This bias may lead to spurious positive estimates of the impact of short-duration leaves. However, using the robust estimator proposed by Borusyak, Jaravel and Spiess (forthcoming), we show that the negative impacts of relatively long maternity leaves are unlikely to be driven by misspecification issues in fixed effects analysis.

In addition to examining the effects of different durations of paid leave, we also investigate the salience of maternal leave policy at different points in a woman's life. In this way, we engage with the idea that a woman's labor outcomes are heavily influenced by her early life environment, suggesting that leave policy impacts young women and girls as well as new mothers. This conclusion, taken in conjunction with our evidence that paid maternity leave policies affect a woman's educational and childrearing decisions as well as labor force attachment, points to the

fact that policymakers should consider the broader implications of paid leave policies over and above their immediate effect on new mothers.

Ultimately, we find that paid leave policy alone is not enough to mitigate child penalties and promote gender equality in the labor market, and that women's labor market decisions are affected by the gender norms of their surrounding environment. As such, policymakers seeking to reduce the child penalty and improve gender equality in the labor force may wish to explore policies that address gendered expectations surrounding domestic work or the potential negative impacts of paid maternity leave – for example, improved childcare systems and enhanced paid paternity leave.

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A Online Appendix: not for print publication

Table A1: Paid leave by country (1970 vs. 2010)

Country	Paid Leave (1970)	Paid Leave (2010)	Difference
Austria	1.11	1.15	0.04
Belgium	0.27	0.54	0.27
Czechia	0.50	2.11	1.61
Denmark	0.27	0.96	0.69
Finland	0.17	0.80	0.63
France	0.27	0.81	0.54
Germany	0.27	1.11	0.84
Greece	0.23	0.82	0.59
Hungary	0.23	2.07	1.84
Iceland	0.00	0.50	0.50
Ireland	0.00	0.50	0.50
Israel	0.23	0.27	0.04
Italy	0.27	0.91	0.64
Luxembourg	0.23	0.81	0.58
Netherlands	0.23	0.81	0.58
Norway	0.23	0.69	0.46
Poland	0.23	0.42	0.19
Portugal	0.17	0.58	0.41
Slovakia	0.50	3.15	2.65
Spain	0.23	0.31	0.08
Sweden	0.50	1.15	0.65
Switzerland	0.00	0.27	0.27
Turkey	0.23	0.31	0.08
United Kingdom	0.35	0.75	0.40
Mean	0.28	0.91	0.63
Median	0.23	0.80	0.57

Data from the OECD Family Database. Paid maternity leave measured in years.

Table A2: Falsification Test: Parent's Education

	Mother's Education		Father's Education	
	(1)	(2)	(3)	(4)
Paid maternity leave	-0.0112	0.0907	-0.136	-0.0154
	(0.162)	(0.157)	(0.142)	(0.134)
Constant	1.895***	0.809***	2.333***	1.049***
	(0.181)	(0.192)	(0.173)	(0.170)
Observations	82,867	82,867	82,867	82,867
R-squared	0.209	0.278	0.164	0.247
Country FE	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

*p<0.1; **p<.05; ***p<.01. Standard errors clustered at country level in parentheses. Independent variable PAID MATERNITY LEAVE indicates the length of paid maternity leave (measured in years) available in a woman's country of birth during the year she turned 18. All specifications include country, birth year, and ESS round fixed effects. Controls included in Columns 2 and 4: years of education the respondent has completed and whether or not they are married. MOTHER'S EDUCATION is a variable that measures the educational attainment of an individual's mother, and FATHER'S EDUCATION does the same for their father.

Figure A1: Robust Estimates, With and Without Sample Restrictions

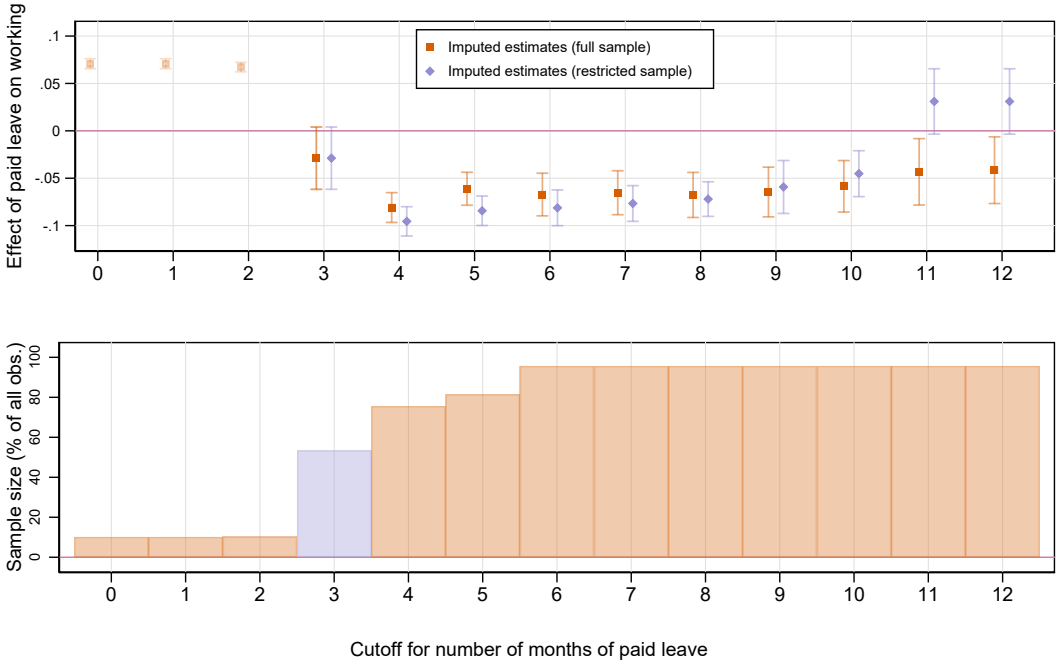

Figure presents regression coefficients and confidence intervals from OLS regressions of the CURRENTLY WORKING variable on indicators for guaranteeing at least 1, 2, 3. etc., months of paid maternity leave, respectively, conditional on country, birth cohort, and survey round fixed effects. All estimates use the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming), which omits countries and years that show no variation in the independent variable of interest. The full sample uses as much data as possible, whereas the restricted sample uses only the data used to estimate the impacts of three months of leave.

Figure A2: The Impact of Paid Leave on Parental Education

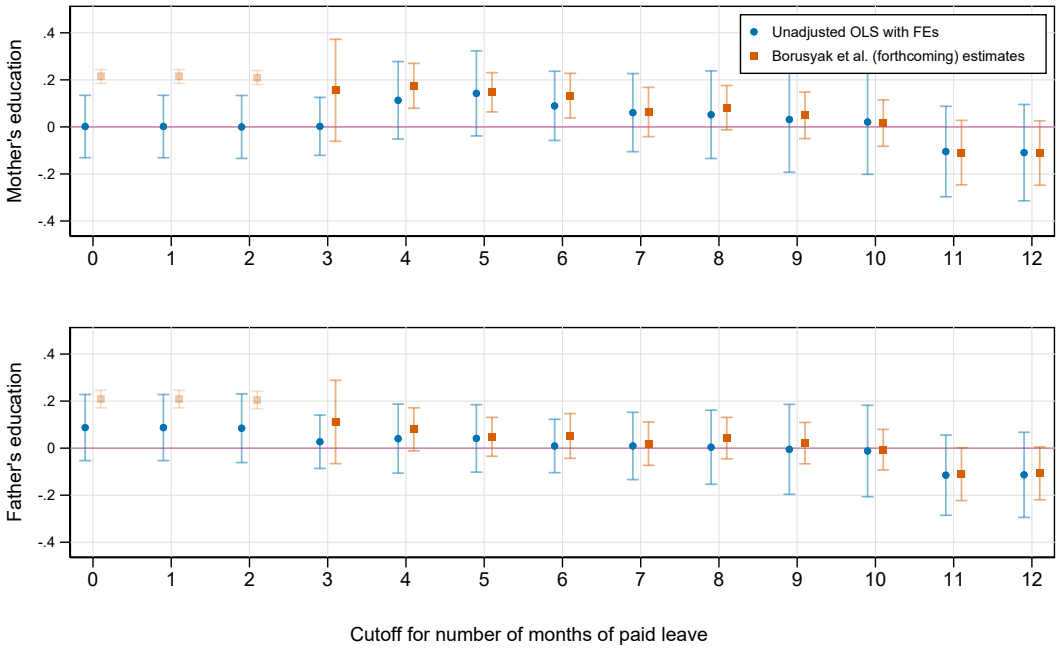

Figure presents regression coefficients and confidence intervals from OLS regressions of the Mother's Education (top panel) and Father's Education (bottom panel) variables on indicators for guaranteeing at least 1, 2, 3. etc., months of paid maternity leave, respectively, conditional on country, birth cohort, and survey round fixed effects. Parental education ranges from one to five, representing educational categories, with higher numbers indicating more education. The figures compare traditional OLS to the the imputation-based estimation approach of Borusyak, Jaravel and Spiess (forthcoming); the imputation-based approach omits countries and years that show no variation in the independent variable of interest.