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Motherhood, Pregnancy or Marriage Effects?

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The existence of large child penalties on women's labor market outcomes has been documented for multiple countries and time periods. In this paper, we assess to what extent marriage decisions and pregnancies (including those ending in non-live births), may explain partly these child penalties. Using data for 29 countries drawn from SHARE, we show that although marriage has a negative effect on women's employment (3.3%), its magnitude is much smaller compared with the negative effect of a first child (23%). Moreover, we find that pregnancies that end in non-live births have non-statistically significant effects on employment in the following years, supporting the exogeneity assumption underlying the identification in child penalty studies. These new results lend support to the hypothesis that child-rearing, rather than marriage or pregnancy, is responsible for women exiting the labor force upon motherhood.

KEYWORDS
Pregnancy, Non-live births, Marriage, Child penalty, Motherhood, SHARE data.

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¿Efectos de la maternidad, del embarazo o del matrimonio?

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Los efectos de tener hijos sobre los resultados laborales de las mujeres (penalidades a la maternidad) están bien documentados para muchos países y períodos de tiempo. En este trabajo evaluamos hasta qué punto ese tipo de efectos se deben efectivamente a la llegada de los hijos, versus los efectos que pueden derivarse de las decisiones de unión matrimonial o de los propios embarazos (incluidos los que terminan en nacimientos no vivos). Utilizando datos de 29 países extraídos de SHARE, mostramos que, aunque el matrimonio tiene un efecto negativo en el empleo de las mujeres (3,3 %), la magnitud de ese efecto es mucho menor a la del efecto negativo del primer hijo (23 %). Además, encontramos que los embarazos que terminan en nacimientos no vivos no tienen efectos estadísticamente significativos sobre el empleo en los años siguientes, lo cual respalda el supuesto de exogeneidad subyacente a la identificación causal en los estudios de penalidades a la maternidad. Estos nuevos resultados apoyan la hipótesis de que la crianza de los hijos, más que el matrimonio o el embarazo, es la responsable de que las mujeres abandonen la fuerza laboral al momento de la maternidad.

KEYWORDS

Embarazo, Matrimonio, Penalidad a la maternidad, SHARE.

1 | INTRODUCTION

A number of recent papers have documented the existence of large child penalties on women's earnings and employment status in different countries and for different time periods. Using harmonized data from 29 countries, Berniell et al. (2021a) show that there is a 25% drop in women's labor force participation after the birth of the first child. Similar effects were found for other countries and periods, for example Kleven et al. (2019a,b, 2021), de Quinto et al. (2021), Cortés and Pan (2020), Kuziemko et al. (2018), Berniell et al. (2021b), and Bhalotra et al. (2021) for a larger perspective of these studies within the female labor market literature.[1]

Most of these studies use an event study approach following Kleven et al. (2019b). Under this approach, the identification of first child effects on labor market outcomes is achieved under the assumption that the timing of birth is exogenous to individual labor market performance, conditional on being a mother within the sample period and on a number of controls. The validity of this assumption, however, is often questioned. Kleven et al. (2019b), for example, addresses this concern by showing the event study approach yields short- and long-run effects of children on women's earnings and labor force participation that are similar to those obtained from widely used alternative approaches, such as instrumental variables and differences-in-differences.[2]

In this paper, we provide evidence supporting the identification assumptions by showing that events that typically occur close to the birth of the first child, which could therefore bias the estimated impacts of the first childbirth, such as marriage, pregnancies that end in non-live births, and other factors that correlate with pregnancies, have either much smaller or non-statistically significant effects on employment compared to the birth of the first child. Thus, we disentangle the effect of the birth of a first child on labor market outcomes from that of an event that usually occurs right before or right after birth, i.e., marriage. Could the motherhood effects found in the literature be accounted for by marriage or cohabitation decisions instead? Although for some women marriage/cohabitation effects may be no more than anticipated motherhood effects, for other women marriage/cohabitation may have an effect on its own (Juhn and McCue, 2017).[3] Its direction, however, is a priori unclear. If upon marriage women start looking for a job or hold on to their previous job to help support the new household, and choose to delay motherhood, then marriage and motherhood would have opposite effects on employment. Alternatively, if upon marriage women discontinue working due to moving, or because they "do not need" to contribute pecuniarily to the household, or because of the gendered division of household chores, then marriage and motherhood would have similar effects on employment although their magnitudes might differ. Our aim here is therefore twofold: a) assess whether the estimated motherhood effects on employment reported in the literature are stemming instead from marriage effects; b) assess whether there is such a marriage effect on employment.

A second threat to the identification of the effects of the first child is the one arising from factors that affect simultaneously the future performance of women in the labor market and

[1] A number of previous works have studied the wage penalty upon motherhood and often use a myriad of well-suited empirical approaches to describe, rather than to causally analyze, this phenomenon. For instance, Gangl and Ziefle (2009) shows large wage penalties associated with interruptions and job changes for the US, UK and Germany.

[2] Concretely, Kleven et al. (2019b) shows that local treatment effects of a third child obtained from an event study approach are similar to those obtained using a sex-mix instrumental variable. Another widely used instrument to estimate this type of causal effects of fertility on labor market outcomes of females is twin births (e.g., Cáceres-Delpiano (2012)). However, the twin instrument has recently received some critics regarding its exogeneity (Bhalotra and Clarke, 2019, Bhalotra and Clarke, 2020).

[3] From this point on, we refer to "marriage" as including marriage and cohabitation.

their fertility. Were these factors at play, we should find that all first pregnancies (including those ending in non-live births) have effects on women's labor outcomes. In addition, pregnancy by itself may produce effects on labor market outcomes, separately from the impact produced by the birth of the child, whether due to biological changes, or to work interruptions due to health complications during pregnancy. In other words, part of the so called child penalty might be due to pregnancy and correlated factors and not specifically to the care required by children once they are born.

As in Berniell et al. (2021a), we use harmonized data for 29 countries from the Survey of Health, Ageing and Retirement in Europe (SHARE) and follow an event study approach to identify separately the effects of marriage, pregnancy and first born children on the labor market participation of women.[4] In the first place, in order to disentangle marriage from childbirth effects, we split the sample of women between those who become mothers for the first time within two years after marriage (*early mothers*) and those who become mothers after the first two years of marriage (*late mothers*). Using an event study approach, we then estimate what we call the marriage effect for both groups. Over the first two years, the latter group suffers a 3.3% decrease in the probability of working, which is relatively small when compared to the almost 23% decrease for early mothers. Because all women in our sample become mothers at some point, their trajectories eventually converge, becoming non statistically different. This exercise reveals a small negative marriage effect, which may be an anticipation of the motherhood effect, but more importantly, it makes clear that it is the birth of the first child that has the largest impact on women's labor market outcomes.

Secondly, to assess to what extent pregnancy or rather factors that correlate with pregnancies have an effect on women's labor market outcomes, we restrict our sample to women who become mothers at some point but whose first pregnancy ends in a non-live birth. We then compare employment trajectories of those who do not have a child in the years following the pregnancy that ended in a not-alive birth to those who do become mothers shortly after. Our results show no statistically significant effect on employment for the former group, compared to a drop of over 30% for the latter, indicating that pregnancy by itself does not seem to account for the estimated motherhood effects. More importantly, the absence of impact on employment for women whose pregnancy ended in a non-live child and did not have a child after provides evidence in favor of the usual identification assumption in the child penalty literature, i.e., that the discontinuity observed at childbirth is not caused by labor outcomes contemporaneously affecting fertility. In line with Lundborg et al. (2017), our exercise provides evidence based on a more suitable control group for mothers than the usual comparison group of all childless women , i.e., other women who do become pregnant at some point in their life and lost their first pregnancy.

In the remainder of the paper we start by describing the data and the empirical strategy in Section 2. In Sections 3 and 4 we compare the marriage, pregnancy and motherhood effects on employment, and in Section 5 we present our main conclusions.

2 | EMPIRICAL STRATEGY

2.1 | Event Study Specification

We estimate the impact of (1) marriage, (2) first pregnancy ending with a not-alive child and (3) the birth of the first child (commonly known as motherhood effects or child penalties) on women's employment using an event study approach similar to Kleven et al. (2019b)

[4] In a related work, Muller et al. (2020) use SHARELIFE for 22 European countries to study the association of family trajectories with women's labor market long run results. They find married mothers suffer a substantial penalty in long-term earnings.

and Berniell et al. (2021a). The description in this section follows closely that in Section 2.1 in Berniell et al. (2021a). In this short paper, however, the same model is used to estimate the effects of three different events separately: marriage, pregnancy and motherhood. Accordingly, we refer to them simply as *the event*.

Consider a panel of $i = 1, ...N$ individuals observed for all or some $t = 1, ...T$ calendar periods (years). Individual i marries or becomes pregnant for the first time or a parent for the first time in calendar period E_i, and positive (negative) $e_{it} = t - E_i$ represent the number of years since (before) the event. Let τ be the relative time index, such that $\tau = 0$ denotes the year of the event for all individuals. The relative time index allow us to compare individuals with the same accumulated exposure to the event even when the event occurred in different calendar years. We model outcome Y for individual i in country c and calendar time t as:

$$Y_{itc} = \sum_{\tau \neq -1} \beta_\tau I(\tau = e_{itc}) + \sum_j \gamma_j I(j = age_{itc}) + \sum_y \delta_y I(y = t) + \sum_s \lambda_s I(s = c) + \varepsilon_{itc}. \tag{1}$$

The first term in the right hand side includes event time dummies. The event time coefficients β_τ for $\tau \geqslant 0$ capture either the post-marriage, the post pregnancy or the post-child effects.[5] We set $\tau = -1$ as the omitted category, thus all β_τ are measured relative to the year before the event. The following terms include a full set of age-in-years dummies, calendar year dummies, and country dummies. In Section 3, we report the percentage effects relative to the counterfactual outcome without marriage/children i.e. $P_\tau = \frac{\hat{\beta}_\tau}{E[\tilde{Y}_{itc}|\tau]}$, where $\tilde{Y}_{itc}$ is the predicted outcome at event time τ from model (1) when subtracting the event time terms. The dependent variable Y represents a dummy variable that takes value one whenever the individual is working at time t and zero otherwise.

2.2 | Data and sample

The data is built from waves 3 and 7 of the Survey of Health, Ageing and Retirement in Europe (SHARE), which correspond to the life histories of respondents, including their working and fertility histories.[6] SHARE surveys longitudinally individuals aged 50 and over in 28 European countries and Israel over 8 waves (as of 2021). Wave 3, and wave 7 for those who were not part of SHARE at wave 3, replaces the longitudinal questionnaire by a SHARELIFE questionnaire , aimed at reconstructing retrospectively, using life history calendar methods, the respondents' partner, residential, and children histories, amongst others. [7]

Our dataset includes the respondents' entire history, such that, for each respondent, there are as many observations as years since his/her birth up to the time of interview. The dataset contains yearly information on employment status, our outcome of interest, which takes value 1 if the respondent was working in a given year and 0 otherwise. The fertility history includes the dates of birth of all children who ever lived and, in wave 3, also the year in which pregnancies that ended with non-livebirths occurred. Both waves include

[5] Long-term effects will also capture the impact of children born after the first child.

[6] Specifically, we use the Job Episodes Panel release 7.1.0 (DOI: 10.6103/SHARE.jep.710). For further details regarding data please refer to Berniell et al. (2021a) .

[7] The 28 countries that are part of the sample in wave 7 are: Austria, Belgium, Switzerland, Germany, Denmark, Spain, France, Greece, Italy, Netherlands, Sweden, Czech Republic, Poland, Hungary, Bulgaria, Croatia, Cyprus, Estonia, Finland, Israel, Latvia, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia and Slovenia. The first 13 countries of the list plus Ireland were the ones included in wave 3.

information on the year the individual married or started cohabiting with his/her partner.

Our sample is made of cohorts born mostly between the 1920s and the 1960s, with an emphasis on early baby-boomers. Hence, most individuals in our sample married and gave birth to their first children between the 1950s and the 1980s. We pool all countries together, which results in a working sample of 45,326 mothers.

3 | MOTHERHOOD OR MARRIAGE EFFECTS?

To assess whether the large labor market effects observed can be attributed to marriage instead of first-childbirth, we split our sample of women into two groups: i) those who become mothers for the first time within two years of marriage (*early mothers*); and ii) those who become mothers after the first two years of marriage (*late mothers*). For this exercise, the event occurring at $\tau = 0$ is marriage. We interpret the difference between the trajectories of the two groups, up to two years, as the motherhood effect. [8]

Figure 1 shows the estimation results. We find that although marriage triggers a drop in employment for both groups of women, it is clear from the slopes of the two curves that the marriage effect is much smaller than the motherhood effect. Over the first two years of marriage, late mothers—i.e., women who do not have children in the first two years of marriage— see their probability of working decrease only by 3.3%, compared to almost 23% for early mothers—i.e., women who have children in the first two years of marriage. Even though it is plausible that the two groups represent different types of women, in the long run their trends eventually become parallel, stabilizing at around -22% for one group, and -26% for the other, being the difference not statistically significant. This exercise reveals a small negative marriage effect, which may also be in part an anticipation of the motherhood effect. More importantly, it makes clear that it is the birth of the first child that has the largest impact on women's labor market outcomes.[9]

[8] The sample does not include married women who never had children because this group of women may differ from the rest in terms of labor market outcomes for other factors different from being mothers.

[9] Juhn and McCue (2017) using a different empirical approach and data for the US compare earnings of childless married women with married women with children under 6 and children between 6-17 and find a much smaller marriage penalty among the childless women, which turns into a premium for the most recent cohorts. We do not compare mothers with childless women and, hence, our results are not directly comparable.

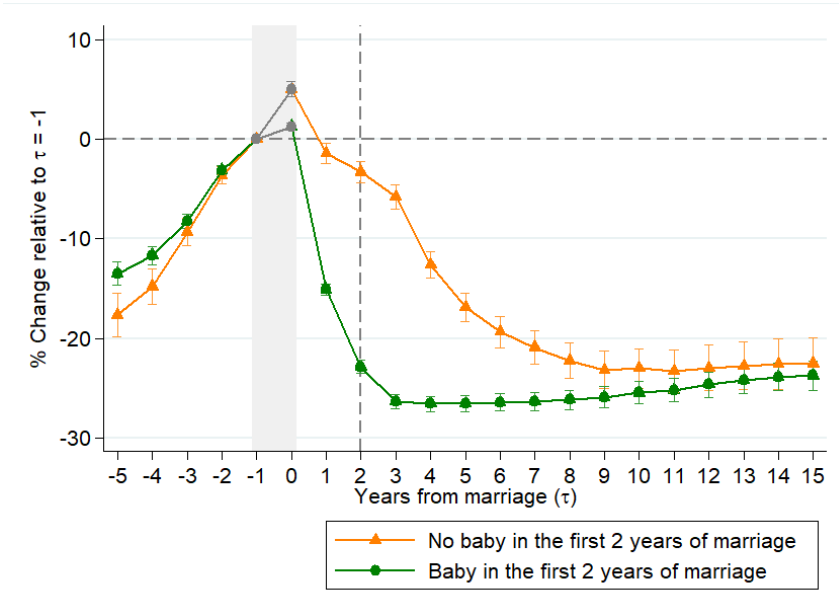


FIGURE 1 Short- and Long-Run Marriage Effects on Employment.

Notes: The graph shows the estimated values of $P_\tau = \frac{\hat{\beta}_\tau}{\bar{Y}}$ from equation (1) based on separate regressions for females who became mothers within two years after marriage (early mothers) and those who did so after the first two years of marriage (late mothers) on the pool sample of all 29 countries when the event at time $\tau = 0$ is defined as "marriage" and the dependent variable is "employed". Although not shown in the graph, the estimation includes leads and lags of up to 20 periods. The standard errors were computed using (clustered by individual) booststraps.

An alternative way to disentangle motherhood effects from potential marriage effects is to estimate the effect of motherhood on employment by controlling for marital status and marriage duration in the long run where the event occurring at $\tau = 0$ is now the birth of the first child as follows:

$$Y_{itc} = \sum_{\tau \neq -1} \beta_\tau I(e_{it} = \tau) \quad + \quad \sum_a \gamma_a + \sum_t \delta_t + \sum_c \lambda_c + \eta \cdot \mathrm{married} \qquad (2)$$
$$+ \quad \pi \cdot \mathrm{married} \cdot (\mathrm{years\ since\ marriage}) + \varepsilon_{it}.$$

A comparison between results with and without the marital controls (see Figure 2) reveals virtually no change in the estimated motherhood effect. In both cases employment of mothers drops substantially (around 25%) after their first child is born. The evidence shown leads us to conclude that it is the arrival of the first child, and not marriage or cohabitation, that causes the largest changes in women's employment.

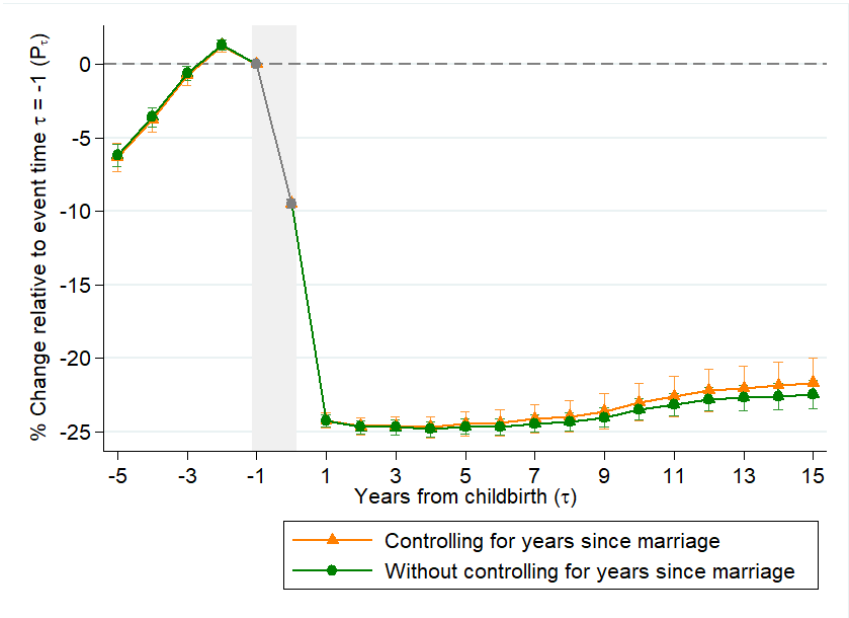


FIGURE 2 Parenthood effects on employment.

Notes: The graph shows the estimated values of $P_\tau = \frac{\hat{\beta}_\tau}{\bar{Y}}$ from equation (3) on the pool sample of all 29 countries in the dataset for women when the event at time $\tau = 0$ is defined as "birth of the first child" and the dependent variable is "employed". Regressions are run separately with and without including "years since marriage" as control variables. Although not shown in the graph, the estimation includes leads and lags of up to 20 periods. The standard errors were computed using (clustered by individual) bootstraps.

4 | MOTHERHOOD OR PREGNANCY?

To disentangle the effect of pregnancy, and the factors that correlate with pregnancies, from first-childbirth we restrict the sample to women who become mothers at some point but whose first pregnancy ended in a non-live child. We then compare employment rates of those who (i) did not have children in the four years following the pregnancy that ended in a non-live child; (ii) those who did have a child within the following four years.[10] We define the event ($\tau = 0$) differently for each group: for the former, it represents the period in which the first pregnancy ended; for the latter it identifies the period in which the first live birth occurred. Using SHARE data and the event study approach as in Berniell et al. (2021a), we compare employment outcomes for both groups of women before and after these events.

Figure 3 shows employment rates of women whose first pregnancy ended in a non-live birth and did not have children within the following four years (left panel) and those who did have a child shortly after (right panel). For the latter group, employment rates fall by more than 30% one year after the birth of the first child. In contrast, for the former group the point estimates are much lower (around 5% one year after the pregnancy ended) and not statistically significant — although the standard errors are large due to the small sample size. These results suggest that it is the first live birth that affects women's employment and not pregnancy by itself or other factors that correlate with pregnancies.

[10] Given that information on non-alive births is only available in SHARELIFE wave 3, we are not able to carry out this analysis for women in wave 7.

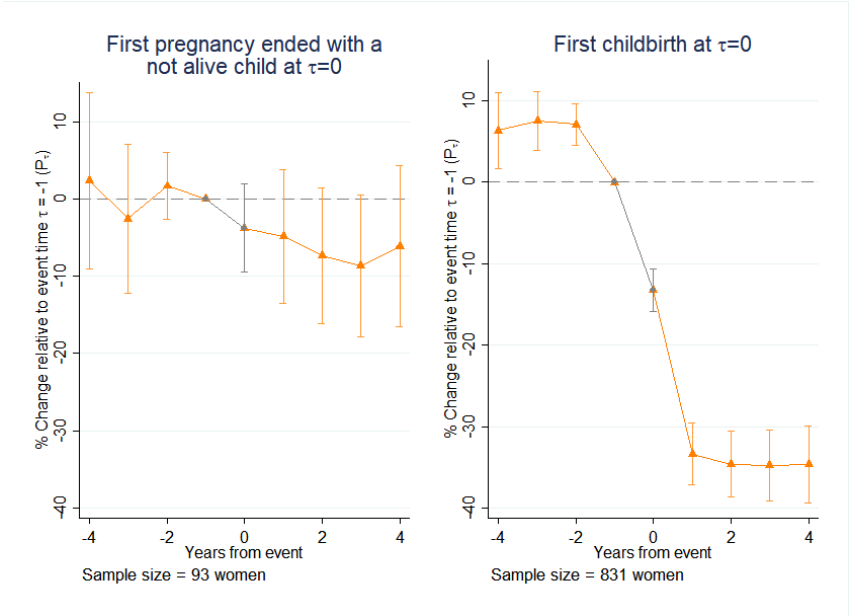
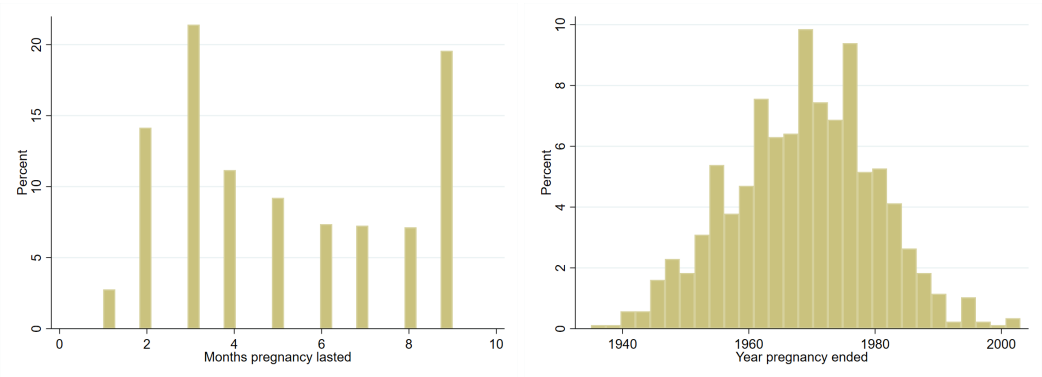


FIGURE 3 Pregnancies with not alive children and first-childbirth effects on employment. *Notes:* The graph shows the estimated values of $P_\tau = \frac{\hat{\beta}_\tau}{\bar{Y}}$ from equation (1) based on separate regressions for mothers whose first pregnancy ended in a non-alive child and (i) did not have a child in the following 4 years; (ii) did have a child in the following four years. Estimations are based on the pool sample of all 14 countries from wave 3 when the event at time $\tau = 0$ is defined as "end of first pregnancy ending in an non-alive child" for the former group and "birth of the first child" for the latter. The dependent variable is "employed". Although not shown in the graph, the estimation includes leads and lags of up to 20 periods. The standard errors were computed using (clustered by individual) bootstraps.

Moreover, this exercise provides evidence in favor of the identification assumptions made in the child penalty literature. In the first place, we contribute to validating the exogeneity assumption by comparing the effects of the first child on employment for a group of very similar women, given that all of them become mothers eventually and underwent a first pregnancy that ended in a non-live birth. This is in line with Lundborg et al. (2017) who use in-vitro fertilization treatment success as an instrumental variable to estimate the effect of having children on labour market outcomes. Second, this exercise addresses the possibility of reverse causality, that is, that the discontinuity observed at childbirth in the employment trajectory of women could be the consequence of labor outcomes contemporaneously affecting fertility, and not the other way around. For instance, if women decide to have children after a shock that negatively affects employment prospects, the direction of the causality is reversed (i.e. a near future employment outcome affects the timing of pregnancy). Given that we do not find any decrease in employment rates of women whose pregnancy ended in a non-live child, this mechanism does not seem to be operating. One potential threat to this analysis remains: pregnancies ending in non-live births may be the result of intended abortions. However, the timing of these pregnancies seem to corroborate the fact that they correspond to miscarriages or stillbirths rather than abortions, as 62% of them in our data ended after the third month, 19.5% during the 9th month (Figure 4a). Even for the 38% of these pregnancies that ended in the first three months, it is highly unlikely that they correspond to abortions as few European countries had legalized abortions in the years those pregnancies ended (Figure 4b),

The results, therefore, point to the demands triggered by child-rearing rather than

pregnancy as the mechanism behind the large drop in employment rates upon motherhood.



(a) Months pregnancy lasted

(b) Year pregnancy ended

FIGURE 4 Pregnancies with non live children.

5 | CONCLUSIONS

Large motherhood effects have been widely documented in a recent literature that encompasses different countries and periods. The birth of the first child implies a sharp drop in women's labor market outcomes, opening a gender gap that does not close even in the long run. These papers usually follow an event study approach relying on the identification assumption that the timing of the first birth is exogenous to individual labor market performance, conditional on becoming a parent in the time period observed as well as on a number of controls. Using data from SHARE, a survey of individuals aged 50 and over in 28 European countries and Israel, and based on an event study methodology, we explore whether two events that occur around the birth of the first child explain part of the motherhood effect: marriage and pregnancy. The former could imply changes in women's labor market participation, by either increasing (or decreasing) their participation given the need to contribute pecuniarily to the household or because of discontinuities due to moving or due to the gendered distribution of household chores within the couple. Pregnancy, on the other hand, could imply changes in the labor market participation of women due to biological changes or due work interruptions caused by health complications, but more importantly pregnancy could be correlated with other factors that may have an effect on women's labor market outcomes.

Our aim is to disentangle the effects of these events from the birth of the first child, assessing whether marriage and pregnancy have an effect of their own on women's labor market outcomes. Regarding the former, we find that two years after marriage, *early mothers* (i.e., women who have their first child within the first two years of marriage) suffer a very large drop (24%) in employment rates compared to a small effect (3.3%) for *late mothers* (i.e., women who have their first child 2 to 4 years after getting married) -which in turn could also be interpreted as an anticipation of motherhood. Over time, once *late mothers* have their child, trends eventually converge, becoming not statistically different 15 years after marriage.

To assess whether pregnancy and, more importantly, other factors that correlate with pregnancies explain the so-called motherhood effect in labor market outcomes, we restrict the sample to women who eventually become mothers but whose first pregnancy ended in a non-live birth. On the one hand, when we estimate the effect of the first pregnancy—which

ended in a non-alive child— on the labor force participation of women, we do not find a statistically significant effect. However, we do find a drop of over 30% in the probability of being employed after the birth of the first alive child, for those same women.

Our results imply that neither marriage nor pregnancy or other factor that correlates to pregnancies by themselves are able to explain the sharp drops in the participation of women in the labor market after becoming mothers. This lends support to the identification assumptions at the core of the motherhood effects literature. Following our results we conclude that it is the arrival of the first child and the care needs associated to it that trigger the most significant changes in women's decisions regarding their participation in the labor market.

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