Inside the black box of child penalties

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Abstract

As developed countries have been unable to completely close the gender wage and participation gap, recent literature has revisited the old findings regarding the existence of child penalties in the labor market. Developing countries, however, present different challenges to the ability of women to work for pay. In this paper, we produce the first formal estimation of the child penalties in the Mexican labor market, and the second in a Latin American

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context. Using an event study approach and an instrumental variable strategy as a robustness check, we estimate the short run impact of children on labor force participation, wages, shifts from hours at work to hours in unpaid labor at home and on transitions between the informal and formal sector. We find significant gaps between men and women in the short run impacts of children on both paid and unpaid work. Results show that the arrival of a child affects members of the extended family unevenly, reinforcing gender roles. We also find that childbirth has a greater effect on lower-income women's wages, and some heterogeneity by income deciles in the magnitude and trends of the effect of children on hours worked, paid and unpaid.

Keywords: Child penalty, Event study, Gender norms, Family structure, Labor outcomes, Mexico.

JEL codes: J12, J13, J16, J22, J31

1 Introduction

In most developed countries, the gender wage gap has gradually narrowed over the past 50 years. In the United Stated and the United Kingdom, for instance, the gap in earnings among full time workers has been shrinking from 40% (1980) to 20% (2015). While early literature on gender inequality in the labor market focused on the role of human capital and discrimination, the disappearance of gender differences in education and the implementation of anti-discrimination policies suggest that the explanation for the remaining gender gap lies elsewhere. In the case of Mexico, there are now slightly more women aged 18-22 attending higher education than men (UNESCO, 2019).

Recent literature has retaken the old findings regarding the existence of child penalties in the labor market (Kleven et al., 2018, 2019; Laun and Wallenius, 2017; Nix et al., 2019). Developing countries, however, present different challenges to the ability of women to work for pay. For instance, gender norms tend to be even more traditional in developing countries (Duflo, 2012; Jayachandran,2014), reliance on extended family members is still common (Gong and Van Soest, 2002; Hank and Buber, 2009; Dimova and Wolff, 2011, 2008), and the existence of a large informal sector that can function either as a source of flexible jobs (Alcaraz et al., 2008; Maloney, 2004; Juarez et al., 2008) or as a buffer mechanism preventing some mothers from exiting the labor force (Berniell et al., 2019; Maloney, 2004).

Female labor force participation in Mexico is strikingly low as compared to countries of similar development. Only 43% of Mexican women participate in the labor market and those who work are over-represented in the informal sector and earn lower wages when compared to their male counterparts. Literature in gender wage gaps has established that caregiving roles are one of the main drivers of gender differences, and that the provision of public services that substitutes for the mother's care increases female labor force participation (see Calderon (2012), for the effect of daycare centers; De la Cruz Toledo (2018), for the effect of universal preschool; and Padilla-Romo and Cabrera-Hernández (2019), for the effect of full-time schools).

This earnings' penalty experienced by women has been termed the "child penalty". Most of the evidence in this area comes from developed countries and few studies explore developing countries where conditions and consequences of having children are different. This paper is the first to document child penalties in Mexico. We use the word penalties, in plural, because we estimate the impact of children on labor market outcomes and throughout different aspects of women's lives, including unpaid work. We extend the traditional child penalty literature to explore the interaction between the child penalties and family structure, by examining how the arrival of a child affects members of the extended family. We also analyze shifts from hours at work to hours in unpaid labor at home and transitions from formal to informal jobs.

We estimate short run effects of parenthood on labor market trajectories of women and men around the birth of the first child, using an event study methodology and panel data from the Mexican Labor Survey (ENOE). The ENOE has the advantage of providing detailed time use, family structure data and employment information for workers in the informal sector. One unique aspect of this survey is that it allows us to examine the impacts on formal versus informal sectors. This is a particularly important potential source of variation in child penalties in developing countries as informal work can be both a source of flexibility and a fallback option for some workers. The rotating structure of the panel (where workers appear up to five consecutive quarters) allows us to look at pregnancy and the postnatal period in detail. Our results are robust to the implementation of an instrumental variable strategy in which we instrument the birth of a second child using the sex of the first child as a source of exogenous variation in the decision to have a child. These results are consistent with Kleven et al. (2018) Denmark's results that show that using alternative instruments for the arrival of a child yield similar results.

We find that the arrival of a child has a strong impact on the labor market outcomes of women irrespective of whether they are working at the beginning of the event. Results show that women start dropping out of the labor force before childbirth, throughout the pregnancy, with the highest decrease right at childbirth. During pregnancy, women's labor force participation starts falling and one year after

birth, women are 43 percentage points (pp) less likely to report positive paid working hours, while men are 4pp more likely. Women who were not working at the beginning of the sample have a 12pp decrease in their probability of entering the workforce. In addition, one year after birth, men have had a 11% ($p < 0.05$) increase in their labor income and women see a decrease of 33% ($p < 0.01$). We observe striking heterogeneity in the effects of childbearing between formal and informal workers: women in the informal sector have a >20pp increase in their probability of leaving the workforce, while women in the formal sector have a 5-10pp increase. We also find significant gender differences in the burden of unpaid labor associated to childbirth. After childbirth, there is an increase in 20 hours of unpaid work for women who also do paid market work, while the effect for men is a 5 hours increase. Hence, childbirth widens the gender gap in unpaid labor, and it appears that women are dropping out of the labor force, but not reducing working hours, as they are shifting time between paid and unpaid work Finally, we analyze heterogeneity along the distribution of wage, hours of paid work and unpaid labor, and we uncover that the effect of childbirth on wages is mostly borne by low-income women. Women in disadvantaged quantiles increase paid hours worked post-birth much faster when compared to women in higher quantiles. This can be indicative of the need to increase the household income as a new member arrives. In contrast, all women experience a decrease participation and hours of work, and an increase in unpaid labor, though the magnitude of the effect and its behavior over time exhibit heterogeneity by income deciles.

This paper is organized as follows: Section 2 describes the vast literature on the child penalties in developed and developing countries, as well as literature on caregiving substitutes and job flexibility. Section Section 3 describes the data. Section 4 discusses the characteristics of our sample, Section 5 details our empirical strategy. Section 6 presents the results and Section 8 concludes.

2 Related Literature

2.1 Child Penalties in Developed Countries

Differences in labor market outcomes and earnings' trajectories associated with marital status and the presence of children are well documented (Waldfogel, 1997; Juhn and McCue, 2016). A large body of literature has shown that the gender wage gap increases at the onset of parenthood (Bütikofer et al., 2018). Literature in this topic has focused on estimating the effect of parenthood across women or men with and without children by exploiting the variation in the timing of parenthood Waldfogel (1997); Budig et al. (2001).

The estimated effect of parenthood on labor market outcomes can be attributed to (a) mothers' career interruptions and thereof a loss in work experience during parental leave, (b) the long-term continuing responsibilities for child rearing associated to decreases in hours worked after childbirth, and (c) a tendency for job changes to more family-friendly firms following childbirth (Angelov et al., 2016; Hotz et al., 2017; Bütikofer et al., 2018). The bulk of the evidence centers in employment patterns across the U.S., several Scandinavian countries and other countries in Western Europe. Most studies use administrative records or longitudinal data, and event study methodologies around the birth of (mainly) the first child. Extended panels and rich administrative registries have allowed several authors to observed women (or couples) for ranges of five to ten years prior or after the birth of a child.

In the U.S., Waldfogel (1997) used difference-in-differences models and panel data to measure the effect of children on women's wages. This study showed that part-time employment accounts for some of the child penalty, but unobserved wage differences between mothers and non-mothers persist. Byker (2016) used an event study methodology and longitudinal data to analyze the pattern of women's work from the two years prior to two years following a birth in the 1980s, 1990s and 2000s. This research found that substantial and sustained birth-related interruptions remain common for mothers across the education distribution. Chung et al. (2017) estimated

the parental earnings gap between male and female partners after the birth of the first child and its persistence of over time. This study uses a household bargaining framework to control for the timing's choice. Results showed that the gap in parental gender earnings increases during the year of birth and the year after the child is born. The gap continues to grow but at a much slower rate for several years, and this fact appears to be driven by the birth of future children.

In Scandinavian countries, Angelov et al. (2016) used universal administrative Swedish registers. These data allowed them to exploit within-family variation over time in order to contrast income and wage trajectories of mothers and their male partners before and after a child was born. Results showed that, 15 years after the first child had been born, the male-female gender gap in income increased by 32 percentage points (pp), and that the gap in wages increased by 10 pp. Nix et al. (2019) used a model of household labor supply before and after the arrival of children to measure the family gap for same sex and heterosexual couples in Norway. In this model, the authors treat gender norms as a "disutility" for men in heterosexual couples from women working outside the home after the child is born. This study uses a rich set of administrative data sets and tax records to link socio-demographic information to labor market earnings, parental leave, benefits, and employment spells. Findings showed that heterosexual mothers present a large child penalty and a significant household income penalty that persists over time. Lesbian couples initially experience a household income penalty of similar magnitude, however the overall household income penalty decreases over time until five years after birth lesbian couples no longer experience a household income penalty from having children. In another study focusing on Norwegian workers, Cools et al. (2017) used administrative records to test the effect of family size on labor market outcomes. In this study, parents' number of children is instrumented with the sex mix of their first two children. Results showed that among college-educated women, having additional children reduced women's probability of being employed by higher-paying firms and also shrinks their probability of being a top earner. Conversely, men do not experience a family size effect in either the short or long run. /citemoberg2016 estimated child penalties

among lesbian and heterosexual couples using a difference-in difference methodology and Swedish administrative data. Several years after childbirth, lesbian couples showed a smaller income gap when compared to heterosexual counterparts. In addition, heterosexual couples showed a gendered pattern of labor market specialization unrelated to the pre-birth income gap, reinforced by traditional gender norms and a gendered division of household labor. In contrast, among lesbian couples, birth-giving partners with a comparatively higher pre-childbirth income continued to be the main provider of the family post-birth.

In a comparative study, Kuziemko et al. (2018) used longitudinal data from the U.S. and the U.K. to examine (1) the effect of motherhood on employment outcomes and (2) how attitudes on gender roles and work-family balance change after a woman has a child, using an event-study framework. Attitudes on gender roles are defined as agreement with statements such as "a woman and her family would all be happier if she goes out to work", or "both husbands and wives should contribute financially." Findings show that before motherhood most women say that work does not inhibit women's ability to be good wives and mothers, after the birth of their first child they become significantly more negative toward female employment. Regarding employment, results show that women's probability of employment declines by 30-40 percentage points upon motherhood in both countries. These estimates are substantially larger than those recently found in Scandinavian countries.

In another comparative study, Kleven et al. (2019) used an event study methodology and a combination of administrative records and longitudinal surveys to estimate the impact of children on the labor market trajectories of mothers and fathers in six countries: Denmark, Sweden, Germany, Austria, the U.K. and the U.S. Results showed the following long-run penalties: Scandinavian countries: 21-27 percent, English-speaking countries: 31-44 percent, and German-speaking countries: 51-61 percent. Sweden is the only country where child birth is associated with a small short-run effect on men, with no long-run consequences. When considering the U.S. and the U.K., short-run effects are smaller, but overall effects grow over time.

In Spain, Fernández-Kranz et al. (2013) used Spanish social security records to study the effect of motherhood on employment outcomes. The results show a drop of 9 percent in motherhood earnings. This study showed that channels through which mothers fell onto a lower earnings's trajectory were: shifts into part-time work, an accumulation of lower experience, or a transition to lower paying jobs. This study showed that actual experience and part-time status are important determinants in the reduction of the estimated child penalty.

2.2   Evidence of Child Penalties in Latin America

Despite substantial evidence in developed countries, there are seldom studies analyzing the motherhood penalty in developing countries. It is relevant to study developing countries' labor markets separately because the context is very different to that of developed economies. In the case of Latin America, the labor market is characterized by lower female labor force participation rates, weaker labor regulations, an insufficient provision of public childcare, an abundance of informal jobs, and in some countries a lack of social safety nets.

In a recent article Berniell et al. (2019) used an event-study methodology to estimate the impact of motherhood on labor outcomes for Chilean women. The results showed that women's earnings fall 20 percent after their first child, and this gap remains stable for about ten years. This drop in earnings is explained by four factors: a 17 percent decline in labor force participation, a drop of 4-5 percent in hours worked, an increase of 40 percent in part-time jobs, and an hourly wage fall of 10-15 percent. This study showed that the negative impact of motherhood on labor market outcomes is present for women regardless of their educational attainment, but the effects are more noticeable for less educated mothers. In addition, the study showed that the informal sector acted as a buffer mechanism by preventing some mothers from exiting the labor force, but taking lower quality jobs.

2.3 Birth Order, Number of Children and Spacing of Births

The wage penalties associated with having children are non-monotonic across the number of children. In the U.S., Waldfogel (1997) found a 4 percent penalty for one child and a 12 percent penalty for two or more children, after controlling for human capital, unobserved heterogeneity, and part-time job status. In a similar fashion, Budig et al. (2001) found penalties of 5 percent for one child, 11 percent for the second child, and 15 percent for the third child.

Across time, the variation of fertility outcomes is far greater than of fertility preferences. In several countries, the desired family size is starting to converge at around the 2 child norm. The challenge lies in explaining the child birth spacing. Delaying first births helps reduce the lifetime income penalty but it may also limit subsequent fertility. Postponement does not necessarily result in fewer births when women can space births closely so to minimize interruptions.

Short work interruptions minimize the loss of human capital associated with wage growth. Women who space their children very far apart may be more likely to have a second birth on the basis of characteristics that are negatively associated with job-related outcomes, such as an unemployment spell.

Spacing births in longer intervals may allow women to re-enter the labor market between childbearing events, avoiding long work interruptions and decreasing the negative effects of subsequent children. (Gough and Noonan, 2013) hypothesized that larger wage penalties should be expected at the extremes of the birth spacing distribution. (Karimi, 2014) used the exogenous variation in birth spacing induced by pregnancy loss between the first two live births, and found that delaying the second birth by one year increases the probability of re-entering the labor market between births.

Fertility research assumes an endogenous decision process in which a woman's career orientation influences motherhood yet fertility preferences may influence their human capital investment, degree of job commitment, and partner selection (Brod-

mann et al., 2007). External child care allows shorter interruptions and paid leave policies can compensate for foregone wages and can potentially diminish interruption (Esping-Andersen et al., 2002).

2.4 Caregiving Substitutes: Child Care Availability, In-House Caregivers and Full Time Schools

A few mechanisms can offset the impact of motherhood on the mother's labor supply: (a) public childcare, (b)in-house caregivers and (c) children's formal schooling attendance. There is a large body of literature that has explored the effects of child care and prekindergarten subsidies, changes in preschool laws, and increases in the supply of schools on maternal employment in developed countries, finding mixed results. (Barua, 2014; Bauernschuster and Schlotter, 2015; Blau and Tekin, 2007; Cascio, 2009a; Fitzpatrick, 2010, 2012; Baker et al., 2008).In Argentina and Mexico Berlinski and Galiani (2007); Berlinski et al. (2011) and De la Cruz Toledo (2018) found positive effects of increasing the supply of preschools and universal preschool on mothers' labor force participation, respectively.

Regarding in-house caregivers, there is evidence that hiring caregivers allow mothers to participate in the labor force or increase their hours of work. (Barone and Mocetti, 2011; Cortes and Tessada, 2011; Cortes and Pan, 2013) showed that female immigrant in-house caregivers have a positive effect on mothers' labor supply. The availability of an unpaid caregiver (usually a family member) also positively influences maternal labor supply. There is evidence that shows within the household, older individuals that do not have formal jobs, are likely to be caregivers for their grandchildren (Hank and Buber, 2009; Dimova and Wolff, 2011, 2008). In the United States, where approximately 20% of employed mothers with children under 5 use grandparents as their primary source of childcare, Posadas and Vidal-Fernandez (2013) found that the availability of childcare provided by grandparents significantly increases mothers' labor force participation by 9 pp.

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The literature has contrasting results on the relationship between family structure and female empowerment. On the one hand, nuclear family is correlated with with equal distribution of inheritance and higher female labor force participation, while in extended families, strong family ties are linked to greater home production, mostly done by women, and lower female labor-force participation (Esping-Andersen, 1999; Korpi, 2000; Alesina and Giuliano, 2010; Bertocchi and Bozzano, 2014). On the other hand, in presence of scale economies, co-residence of the wife with other women could reduce the burden of household work, freeing up her time for non-domestic work and allowing for more participation in market activities, which gives women financial independence and bargaining power (Tur-Prats, 2015). In the case of Mexico, Gong and Van Soest (2002) found that the presence of an additional adult female in the household increases the labor supply of mothers with young children. The joint presence of young children and an adult female (who can presumable take care of the child) decreases fixed costs of working and increases the probability of working.

A third mechanism is formal schooling attendance, which frees the family from childcare during schooling hours, also allows mothers to work (Blau and Currie, 2006; Cascio, 2009b; Gelbach, 2002). In Mexico, Padilla-Romo and Cabrera-Hernández (2019) used within-individual variation in access to full-time schools to test whether longer school hours for young children would have an effect on maternal labor supply. Results from this study showed that extending the school day did increase mothers' labor for participation by 5.5 pp and the number of weekly hours worked by 1.8 pp.

2.5   Preference for Job Flexibility and Informality

Childbearing changes women's work life in several ways. On the one hand, in absence men's time investment on household production, women with children require more flexibility to be able to combine paid work with care work. A mismatch between women's need for flexibility and several industries' payroll structure has driven an increasingly important part of the wage gap (Goldin, 2014). In the industries that have developed the ability to provide this flexibility, the sex ratio and the wage gap

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have improved significantly. That is the case of the pharmaceutical industry in the U.S.: the growth of large national pharmacy chains and hospitals, and the related decline of independent pharmacies, played a key role in the creation of a more family-friendly profession. As a consequence, the female to male ratio for median annual earnings of full-time, full-year workers grew from 0.66 in 1970 to 0.92 in 2010 (Goldin and Katz, 2016; Goldin, 2014).

Informality can be a source of flexibility. While there is a wage penalty of approximately 13 percent once controlling for selection into the informal sector (Alcaraz et al., 2008), workers in the informal sector could be obtaining unobserved benefits, such as a greater flexibility in working hours, among other benefits, which could lead them to accept a lower hourly wage. Maloney (2004) shows that while men almost never cite competing household chores as the reason for choosing the informal sector, 31 percent of self-employed women and 13 percent of informally employed women do. Moreover, when Mexico City's government introduced free healthcare in 2001, Juarez et al. (2008) observed that low-educated women moved to the informal sector and earned a little more as a result. This result also suggests that there is a compensating wage differential in women's work in the informal sector.

Berniell et al. (2019) has pointed out that the informal sector can act as a buffer mechanism preventing some mothers from exiting the labor force. However, even though informal jobs can provide a safety net in case of job loss and a source of income for uninsured workers during the job search period, instability and lack of benefits make informal jobs less desirable. In Mexico, Alcaraz et al. (2008) analyzed the period 2001-2004, in which the country experienced a significant decline in the manufacturing sector due to the rise of Chinese manufacture. The authors concluded that, in the presence of labor market rigidities, many workers were not able to find a formal job in the service industry. During this time period, more than 60 percent of workers who went from formal to informal employment suffered a drop in real wages, while those who moved from informal to formal employment, more than 55 percent experienced an increase in their income.

2.6 Discrimination

The informal sector may serve as a buffer from women's unemployment, and job losses may be related to pregnancies. In Mexico, women are more discriminated against for being pregnant than for any other condition as evidenced by the figures: from the annual complaints filed by the Council to Prevent and Eliminate Discrimination in Mexico City (COPRED, for its Spanish acronym), between 38 and 48 percent are from women fired for notifying that they were pregnant. Maloney argues that this view of the informal sector as "a residual comprised of disadvantaged, workers rationed out of good jobs" (Maloney, 2004, p. 1159). However, while he finds that most self-employed informal men in Mexico claim switching to the informal sector in order to be independent (37 percent) or to get a better pay (22 percent), most women switch to the informal sector because of marriage (46 percent) or being fired (12 percent).

3 Data

Most studies on child penalties use administrative data (Nix et al., 2019; Angelov et al., 2016). The advantages are straightforward: larger samples and identifiers that allow the researchers to match the employment records with other administrative data sets for long periods, which allows to have more controls or mediators.

The quarterly Mexican Labor Survey (ENOE, for its Spanish acronym) is a labor market rotating panel survey collected by the National Statistical and Geography Institute (INEGI) in Mexico since 2005. Each household is included in the sample for five consecutive quarters, with around 21,000 households entering the sample in each round of the survey. Unlike administrative survey data, ENOE has the advantage of providing detailed family structure data. In the Mexican statistical framework designed by INEGI, households are defined as a group of individuals that live in the same dwelling space and that share food expenditures, which allows us to

identify extended family members both vertically and horizontally.

The factors highlighted in Section 2.4 point at family structure as a potential source of variation in the child penalty, which is one of the main contributions of this paper. In 2017, average household size ranged from less than 3 in North America and Western Europe to more than 6 in some parts of Sub-Saharan Africa and the Middle East. In Mexico, 36 percent of households are multi-generational, compared to 15 percent in the USA, and 50 percent in India. (Women, 2019)

Another key advantage of using household surveys is that in a country with a large informal sector, administrative records do not provide the full picture. For instance, administrative records from the Mexican Institute of Social Security (IMSS) only collect information from formal sector workers, and the employers tend to under-report wages to avoid payroll taxes and social security contributions. Using ENOE (2018, Q4) we find that 52 percent of the labor force works in the informal sector, with a slight over representation for women.

Our empirical analysis is based on the survey data from ENOE between 2005 and 2019. For our sample, we choose people that we can see at least four times in the panel, that are not full time students, and within the 16-64 years age range. In our main results, since we do not expect mothers out of the labor force to begin working after having a child, we also restricted the sample to those parents who were initially working. Our results, though, are not sensitive to this sample restriction. To estimate the child penalty, we do not impose restrictions on the relationship between the parents of the children, but we do focus only on heads of household and their partners, because we can only identify their children. The database also has the exact date-of-birth which allows us to time the event very accurately.

4 Descriptive Statistics

Table 1 shows the descriptive characteristics of women who have children, childless women and men for the age range described in the previous section. To obtain the mean values for this table, we used the weights provided in the survey. All monetary values are in Mexican pesos and have been deflated using the consumer value index. The variable used to define an informal job is based on combinations of the type of employer, sector, size of the firm and self-employment. This variable is coded and provided in the database. In order to show more nuances of the informal labor market, we also add variables regarding the type of job contract and the type of benefits that a worker might receive.

On the first two columns of this table, we compared mean values of all men and all women and we observe that there is a substantive difference in the labor force participation rate, labor income, wages and household income between men and women, with women having lower values in all of this labor market outcomes.

On the following two columns we restricted the sample to mothers who are heads of the household and reported having a child (with no age restriction on the age of the child), and compare them to childless mothers who are also head of the household. Mothers, when compared to childless women, have significantly lower labor force participation rates (48% v. 58%), lower hourly salaries ($10.5 v. $14.2) and lower labor incomes ($3,124 v. $3,138). Mothers are also more likely to work in the informal labor market and in jobs that offer no contracts, in comparison to childless women, which indicates the that mothers have a preference for flexible job schedules to combine care-giving with job responsibilities. This can also be observed in the large gender and family gap observed in unpaid hours of house work and time spent on unpaid care. These findings are in line with the literature that shows that family-friendly workplaces can be the mechanism that facilitate mothers' ability to balance work and family responsibilities (Hotz et al., 2017). Since mothers are the main caretakers of children, this could explain why workplace family friendliness mainly benefits mothers.

On average, mothers are less educated than women with no children, are more likely to be married and are slightly older than childless women.

Table 1: **Workers' characteristics by gender and parenthood status (2005-2019)**

	All Men	All Women	Non-Mothers	Mothers
Labor force participation rate	0.80	0.46	0.58	0.48
Hourly wage	$15.8	$8.9	$14.2	$10.5
	(0.024)	(0.020)	(0.105)	(0.043)
Monthly labor income	$3,647.1	$2,817.9	$3,924.9	$3,138.4
	(4.392)	(4.284)	(24.525)	(7.662)
Total household income (monthly)	$6,683.6	$7,240.1	$7,551.6	$7,481.1
	(6.841)	(9.212)	(45.824)	(16.03)
Average household income (monthly)	$1,761.9	$1,902.9	$3,758.4	$1,825.5
	(2.275)	(2.874)	(22.554)	(4.287)
Hours worked	44.8	36.8	38.8	35.8
	(0.015)	(0.019)	(0.072)	(0.032)
Hours of housework	3.339	17.9	14.9	20.5
	(0.005)	(0.014)	(0.048)	(0.022)
Hours of unpaid care	1.7	5.7	0.693	9.503
	(0.005)	(0.014)	(0.019)	(0.027)
Has an informal job	0.56	0.574	0.41	0.54
Has fringe benefits (except health)	0.42	0.45	0.60	0.47
No contract	0.33	0.28	0.23	0.25
Age	37.7	37.9	35.4	37.4
	(0.011)	(0.013)	(0.052)	(0.016)
Currently enrolled in school	0.05	0.06	0.08	0.03
Less than primary	0.12	0.10	0.06	0.06
Completed primary	0.20	0.17	0.10	0.15
Lower secondary	0.33	0.30	0.20	0.33
Upper Secondary	0.20	0.23	0.25	0.25
College or more	0.15	0.20	0.40	0.22
Married	0.68	0.528	0.50	0.75
Single	0.27	0.33	0.47	0.13
Divorced/ /Widowed	0.04	0.14	0.03	0.13

Notes: The analytic sample consists of individuals ranging from 16 to 64 years of age. Standard errors are shown in parentheses for continuous variables. Statistical significance differences are found for all outcomes through individual t-tests. Wages and labor income are denominated in Mexican pesos and are deflated using 2018 consumer price index. Average household labor income considers the number of household members.

Figure 1 shows the trend of the female/male ratio of earnings, calculated as the exponential mean of log earnings difference, not controlling for worker's characteristics. This figure includes two ratios, one for workers with children and one for childless workers. Both ratios show that from 2005 to 2012, childless women and mothers improved their earnings with respect to their male counterparts. During this period, the ratio is flatter for women with children. After 2012, the ratio flattened out for mothers and worsened for childless women, remaining at around 77%-78%. The pattern of the earnings' ratio overall is comparable to what has been observed in developed countries (See Bütikofer et al. (2018) and Juhn and McCue (2017) for further reference).

Figure 1: Growth of Female/Male Earnings Ratio
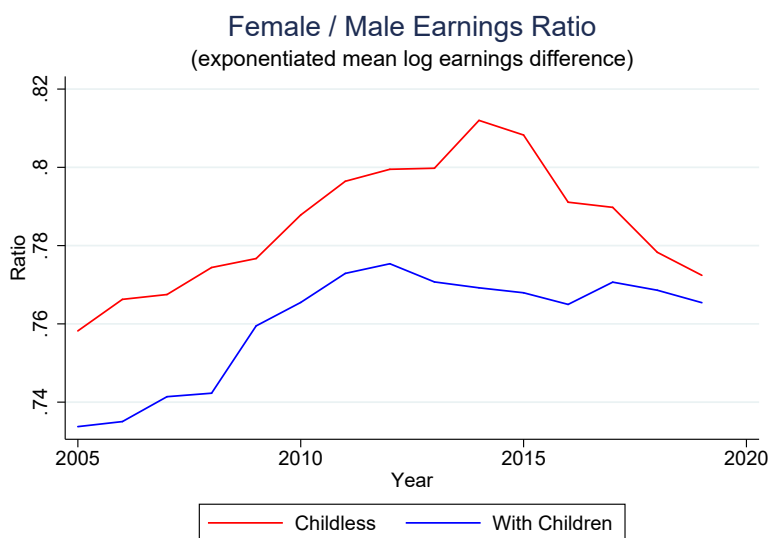
Notes: The figure illustrates the mean earnings female to male ratio using a series we constructed from ENOE quarterly data from 2005 to 2019. To calculate this ratio, we followed the methodology used in Current Population Reports as described in Juhn and McCue (2017). This methodology consists in using exponential mean earnings for women and men. We divided the sample into workers with children and with no children.

Figure 2 shows the labor force participation rates of men and women. As shown in the figure, there is a wide gap in the labor force participation rates of men and

women and in addition male/female trajectories differ. For men there is no change in the trajectory or the gap between men in child rearing age in comparison to men of all ages. In the case of women there is an increase in the participation of all women, but the slope in the trajectory of women in child rearing age is stepper.

Figure 2: Labor Force Participation Rate
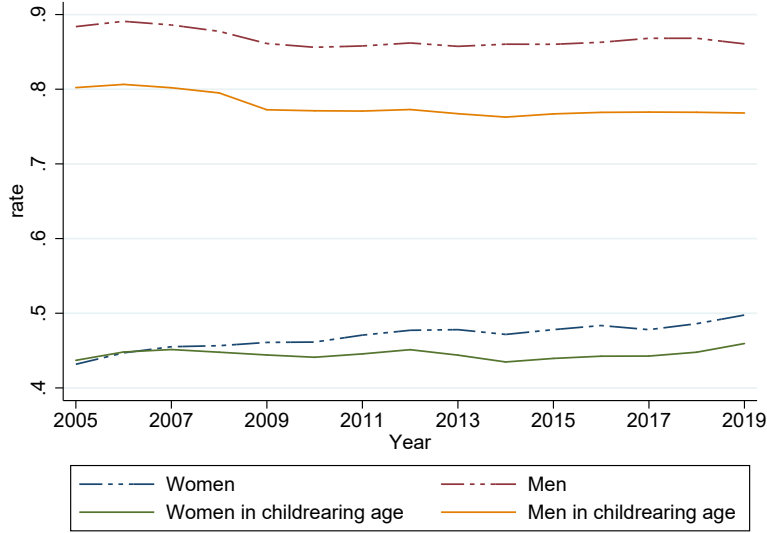
Notes: The figure illustrates the employment trajectories of men and women in child rearing age using the ENOE series for 2005-2019

Figures 3 and 4 show the trend from 2005 to 2019 for the labor market outcomes of women and men of all ages and for child rearing age. Figure 3 shows that the trajectory of wages and labor income is similar for all groups, but men's wages are higher than those of women. A sizeable gender gap is observed in monthly labor income (that accounts for hours worked) between men and women. Household income shows similar trajectories for men and women, but also implies that women in child rearing age are likely to be living in large households. Additional trajectories of other indicators can be found in the appendix.

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Figure 3: Labor Market Outcomes
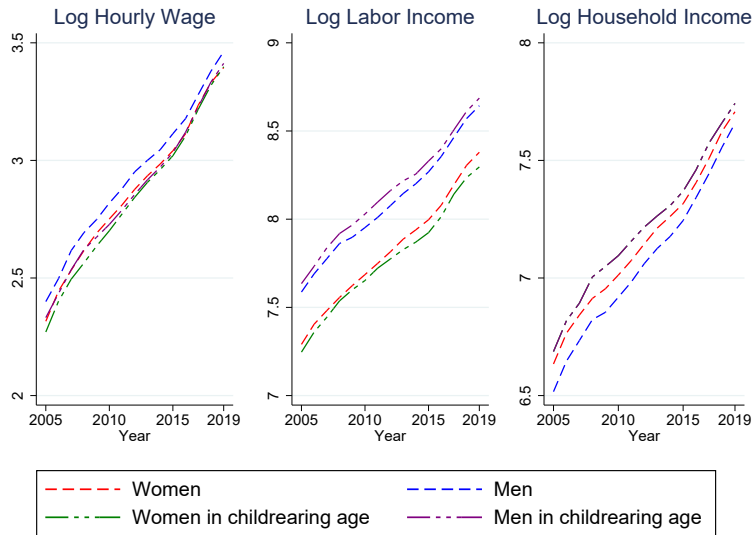
Notes: The figures illustrates hourly wages and monthly labor and household income using the ENOE series for 2005-2019. All series are shown in logarithmic terms.

Figure 4: Hours of Paid and Unpaid Work
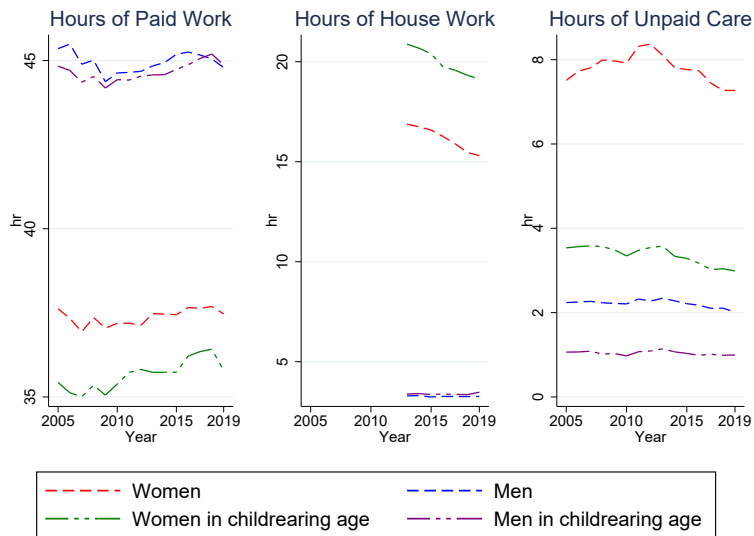
Notes: The figures illustrates weekly hours of paid and unpaid work using the ENOE series for 2005-2019.

Figure 4 shows the trajectories of paid hours worked in the labor market, unpaid hours of house work and hours spent taking care of relatives or children living in the household. There is a marked gap in the trajectory of labor market hours between men and women, with men of all ages prevailing at the top of the distribution, followed by men of child rearing age. The trajectory of working hours for women is much lower than that of men and the trajectory of women in child rearing age is at the bottom of the distribution. As expected, women are typically spending more time on house work and unpaid care. These trends are in line with what is observed in the literature and most likely contributes to gender differences not only between men and women across the board, but also between men and women (Boye, 2008; Angelov et al., 2016).

5 Empirical strategy

5.1 Event study

Our main identification strategy is an event study, where the event is the birth of a child. There are two underlying identifying assumptions in this framework. First, while the choice of having children is potentially endogenous to other determinants of labor choices and income, the exact timing of conception and birth are assumed exogenous (Hotz et al., 2017). Second, we assume that no other determinants of labor market outcomes –this is, factors unrelated to child's arrival– experience a sharp discontinuity at childbirth. Under these assumptions, we can then interpret the corresponding discontinuity in labor market outcome y_{it} as the causal effect of having a child: the child penalty.

The estimating equation of our event study is as follows:

$$y_{it} = \sum_{j \neq -4} \alpha_j^s \cdot 1[t = j] + \sum_{k} \beta_j^s \cdot 1[age_{it} = k] + \sum_{q=2005_{q1}}^{2019_{q3}} \gamma_q^s \cdot 1[date_{it} = q] + \Theta_i + \epsilon_{it}, \quad (1)$$

where $s \in \{males, females\}$ is the gender of parent i, age_{it} is the age of parent i at date (quarter, year) t, and hence β_y^s are the age fixed effects, γ_y^s are the date fixed effects and Θ_i are the individual-level fixed effects. We omit the event time dummy at $t \neq 4$ because we use the period just before conception as the baseline to measure the child penalties. As in Kleven et al. (2019), by including a full set of age dummies we control non-parametrically for underlying life-cycle trends, and by including a full set of year-quarter dummies we control non-parametrically for time trends such as wage inflation and business cycles.

First, we exploit the small rotating panel structure of the Mexican Labor Survey (ENOE) to estimate the short run effects of parenthood using the birth of the first and subsequent children as the event to be evaluated. Using this short run estimate, we explore how the gender gaps in time used for care giving activities and extended families impact the size of the child penalty. In section 6.3, we also explore the interactions between childbearing and labor informality, understanding informality as both a potential back up in case of job loss or a choice for women who need more flexibility after having children.

# 6 Quantifying the Child Penalty in Mexico

We examine earnings penalties on three margins: the extensive margin (employment), the intensive margin (hours worked), and the wage rate. We also analyze the effect of childbirth by informality status, as well as the transition dynamics between the formal and informal sectors. Overall, our results highlight no only the existence of child penalties, but also to a pregnancy penalty on participation, on hours worked, on hourly wages, and, as a result, on monthly labor income. The timing of the effects raises hypotheses about the role of discrimination and job insecurity that we will explore in future steps of this research.

6.1 Labor Market Outcomes

All figures show the child penalty on the outcomes of interest for both men an women. Each dot represents the estimated coefficient α_j^s from equation (1) for quarter j, $j = \{-3, -2, ..., 3, 4\}$, being the quarters before and after the birth of a child. Coefficients (α_j^s) are interpreted *vis-à-vis* 4 quarters before the birth of the first child.

Figure 5 presents the child penalty on the probability of labor force participation for both men an women. Overall, fathers' participation rates do not vary much on average before or after childbirth. If anything, men experience a slight increase (4 pp) in their participation rates two quarters after their child is born. In contrast, women experience a sharp drop on average in their probability of participating in the labor force even before childbirth. More specifically, we find that women begin dropping the labor force three quarters before having their child. This timing matches the whole pregnancy period: (1) from the trimester before conception to the beginning of the pregnancy, women's labor force participation drops 14 pp; (2) during the first trimester of pregnancy, the accumulated drop amounts to 28 pp; (3) in the third trimester, the drop further increases to 36 pp; and finally, right at childbirth, the participation has decreased by approximately 62 pp as compared to 4 quarters before childbirth. After having their child, some women return to the labor force, thus the relative drop in participation starts decreasing in magnitude. However, the participation rates remain at a much lower level after childbirth: four quarters after giving birth, almost half of the women who were initially working are not working anymore.

Figure 5: Short run impacts of children on labor force participation
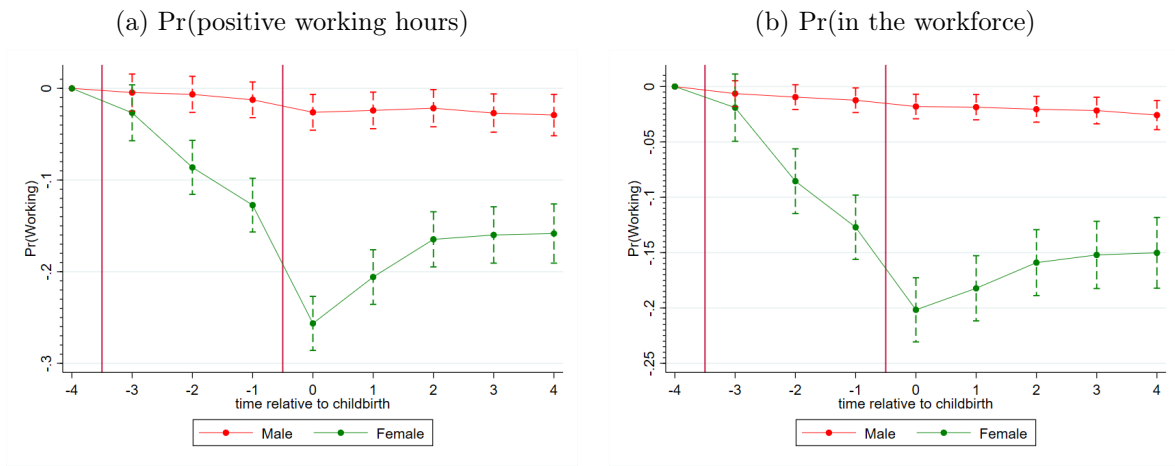
(a) Pr(positive working hours)   (b) Pr(in the workforce)

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graphs show the percentage point impacts of children on women's outcomes as defined in Equation 1, where y_{it} is the outcome of interest. The estimates are calculated conditional on working at the beginning of the sample. The X-axis represents quarters before and after childbirth.

Figure 6: Impacts of children in the short run on labor force participation
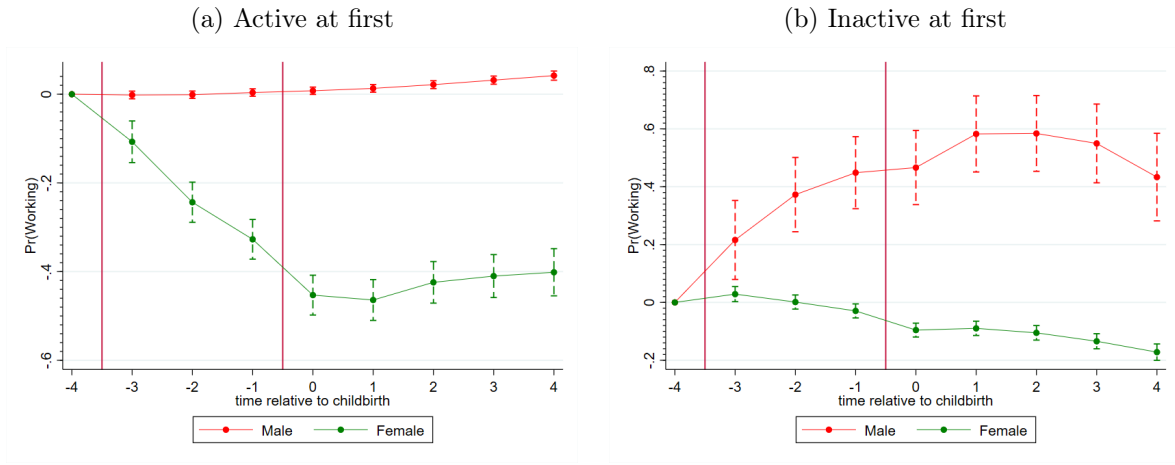
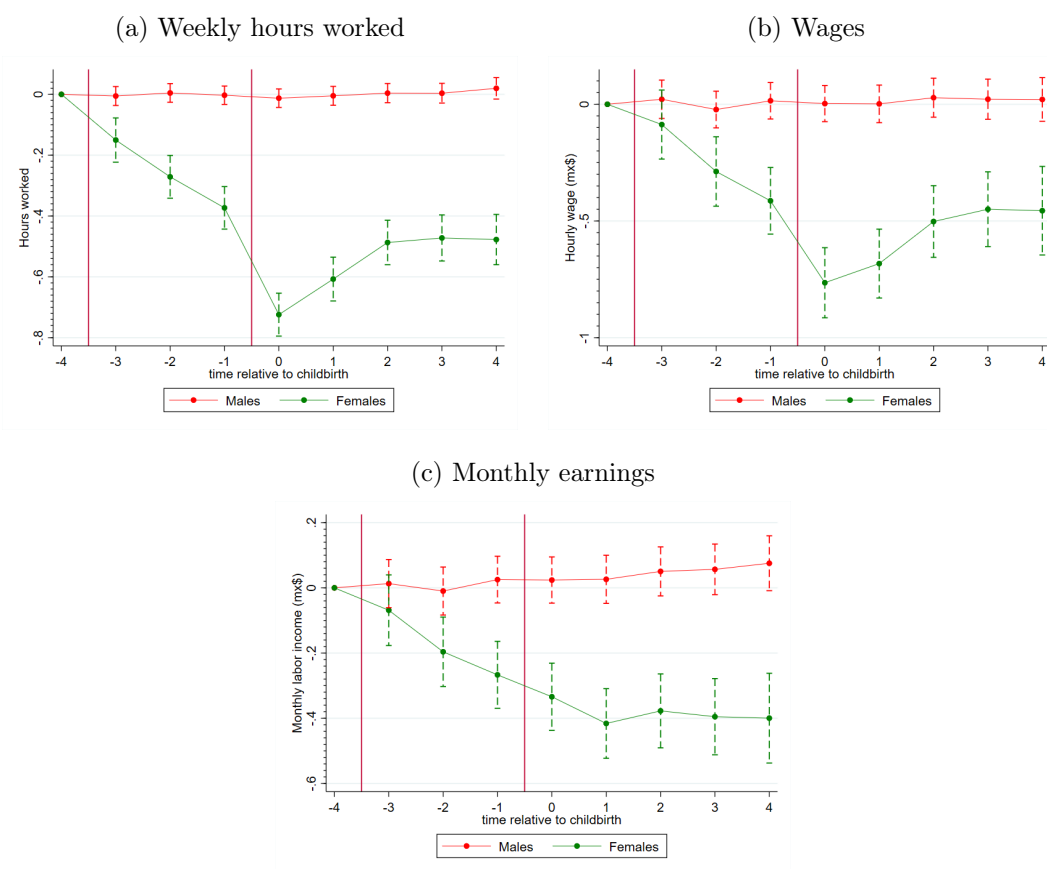(a) Active at first   (b) Inactive at first

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graphs show the percentage point impacts of children on women's outcomes as defined in Equation 1, where y_{it} is the outcome of interest. The estimates are calculated conditional on working at the beginning of the sample. The X-axis represents quarters before and after childbirth.

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Hours of work and earnings also exhibit a child penalty. Panel (a) in Figure 7 shows that men's hours of work remain relatively constant throughout the pregnancy period. However, a couple of quarters after childbirth, men increase their working hours by 4%. However, and as expected from the results above, women begin reducing their working hours during the pregnancy. By the time women give birth to their child, the child penalty amounts to 70%. As a result, the gender gap in working hours begins to increase right from the pregnancy. With respect to wages and monthly earnings, the results show a similar pattern to that in working hours. However, changes in these variables are not statistically significant in the case of men. In the case of women, both wages and, consequently, earnings begin dropping since the beginning of the pregnancy. By the time of childbirth, the drop in wages and earnings amounts to 85% and 38%, respectively, and recover only slightly in the observable period after birth.

Figure 7: Short run impact of children on hours of work, wages and earnings

(a) Weekly hours worked

(b) Wages

(c) Monthly earnings

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graphs show the percentage point impacts of children on women's outcomes as defined in Equation 1, where y_{it} is the outcome of interest. The estimates are calculated conditional on working at the beginning of the sample. The X-axis represents quarters before and after childbirth. Wages and earnings are measured in real terms.

Figure 7 above includes people who were initially working, but could eventually stop being employed. In order to uncover, an actual drop in earnings, Figure 8 presents the estimations for the sample of people who worked all the period. We estimate that there is a sharp drop in hours work during the pregnancy, but specially at childbirth. Hours of work recover somewhat, but do not return to their original level ($t = -4$). In addition, wages drop 60 percent at childbirth as compared

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	(1)	(2)	(3)	(4)	(5)
	LFP	Wage	Paid hours	Income	Unpaid hours
t_{-3}	-0.141***	-0.166*	-0.159***	-0.105*	0.128**
	(0.0243)	(0.0925)	(0.0331)	(0.0602)	(0.0568)
t_{-2}	-0.268***	-0.361***	-0.277***	-0.230***	0.167***
	(0.0235)	(0.0931)	(0.0320)	(0.0602)	(0.0562)
t_{-1}	-0.359***	-0.519***	-0.376***	-0.311***	0.180***
	(0.0232)	(0.0888)	(0.0318)	(0.0571)	(0.0568)
t_0	-0.627***	-0.844***	-0.693***	-0.373***	0.608***
	(0.0231)	(0.0915)	(0.0323)	(0.0563)	(0.0584)
t_{+1}	-0.549***	-0.827***	-0.610***	-0.455***	0.993***
	(0.0243)	(0.0919)	(0.0332)	(0.0591)	(0.0592)
t_{+2}	-0.441***	-0.648***	-0.472***	-0.363***	0.893***
	(0.0248)	(0.0932)	(0.0342)	(0.0645)	(0.0613)
t_{+3}	-0.430***	-0.519***	-0.465***	-0.348***	0.916***
	(0.0265)	(0.105)	(0.0362)	(0.0670)	(0.0659)
t_{+4}	-0.475***	-0.667***	-0.533***	-0.336***	1.031***
	(0.0321)	(0.132)	(0.0438)	(0.0798)	(0.0803)
Observations	1,186,710	1,186,710	1,186,710	1,186,710	1,177,690
R^2	0.440	0.402	0.584	0.510	0.674

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The estimates indicate the percentage point impacts of children on women's outcomes as defined in Equation 1, where y_{it} is the outcome of interest. The estimates are calculated conditional on working at the beginning of the sample. Wages and earnings are measured in real terms. All estimations include individual and quarter fixed effects.

Table 2: **Short run effect of children in labor market outcomes of women**.

to a quarter before conception. However, this negative effect is short lived, since two quarters after childbirth the wages are not statistically different to those that prevailed before conception. Surprisingly, we not find any child penalty on earnings. Though female earnings drop, the difference from $t = -4$ is not statistically different from zero. We do not find any effects of childbirth on these labor outcomes in the case of men. Table 2 summarizes the results from Section 6.1 and Section 6.2.

Figure 8: Short run impact of children on hours of work, wages and earnings for those who continued working
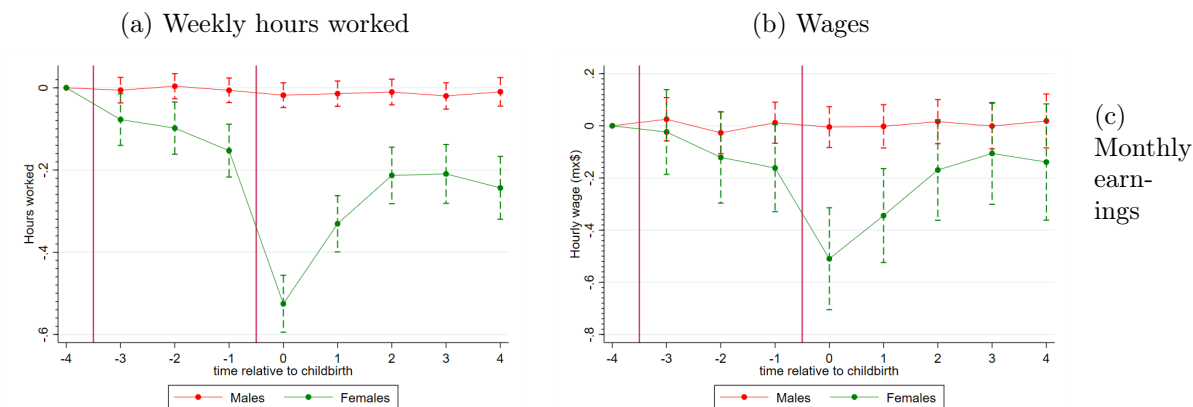
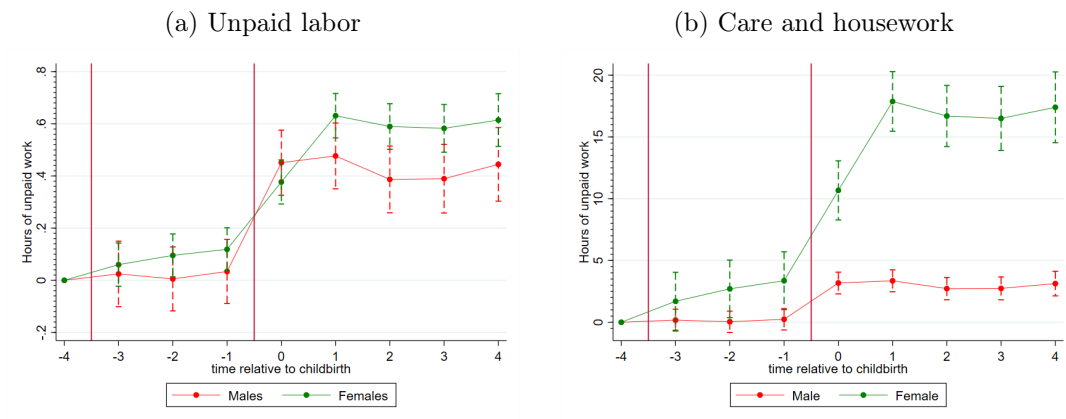(a) Weekly hours worked

(b) Wages

(c) Monthly earnings

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graphs show the percentage point impacts of children on women's outcomes as defined in Equation 1, where y_{it} is the outcome of interest. The estimates are calculated conditional on working during the whole period. The X-axis represents quarters before and after childbirth. Wages and earnings are measured in real terms.

6.2 Unpaid work

Hence, what are women doing with their time? How is the childcare load shared among men and women? Figure 9 presents the results for the percentage changes in hours of unpaid labor (Panel a) and the percentage changes in the hours dedicated to care and housework. Men increase their hours of unpaid labor by more than 50 percent right at childbirth, whereas women increase them by less than 40 percent. However, women continue increasing their unpaid labor up to 60 percent as compared to $t = -4$, and end up increasing their hours of unpaid labor more than men even one year after birth. With respect to care and housework, we find that male increase their hours by 50 percent at childbirth, whereas women only do so 30 percent. This may be explained by the post-partum recovery, in which women dedicate their full time to their babies, and men help around the house much more than they previously did. However, women continue increasing their hours of care and housework during

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the first quarter after birth, and end up with an increase comparable to that of men.

Figure 9: Unpaid hours of work

(a) Unpaid labor

(b) Care and housework

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graphs show the percentage change impacts of children on men and women's weekly hours of unpaid work as defined by the coefficients α_{js} in 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

Looking at percentage changes might veil the gender gap in unpaid labor and caregiving hours, because men part from a much lower basis. Figure 10 shows the absolute change in unpaid hours of work, which include unpaid labor, and care and housework. We find that even when men do increase their hours of unpaid work by around 4 hours per week, women increase their unpaid work by 7 hours per week at childbirth, and by almost 20 hours per week one year after childbirth. Thus the gender gap in the amount of time dedicated to unpaid work widens after childbirth by a little more than 15 hours per week. Figure 11 shows that there are child penalties for female members of the household who are not the mother of the children: one year after birth, their labor force participation has decreased between 18 and 70%.

Figure 10: Total hours of unpaid work
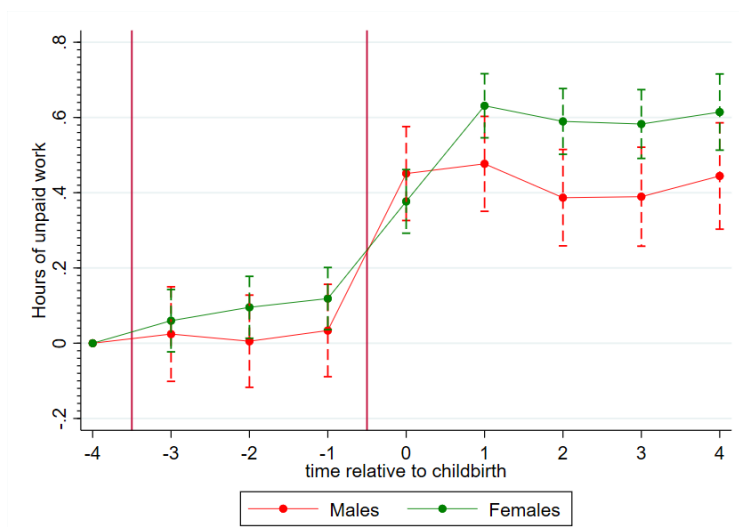
6.3   Informality

As we explained in Subsection 2.5, in developing countries, the informal sector may
act as a buffer to unemployment, or as a means to find more flexible jobs. We next
test how childbirth affects transitions in the occupational status, where we define
three statuses: inactivity, formal employment, and informal employment.

Figure 12 presents the probability of going from formal (a) or informal (b) em-
ployment to inactivity. We do not find any effect of children on men's leaving the
labor force. However, in the case of women, we find that the probability of leaving
the labor force begins increasing during the pregnancy, and reaches a peak in the
quarter after childbirth for formal workers and at childbirth for informal workers. At
these peaks, women in the formal sector have a 10 pp greater probability of quitting
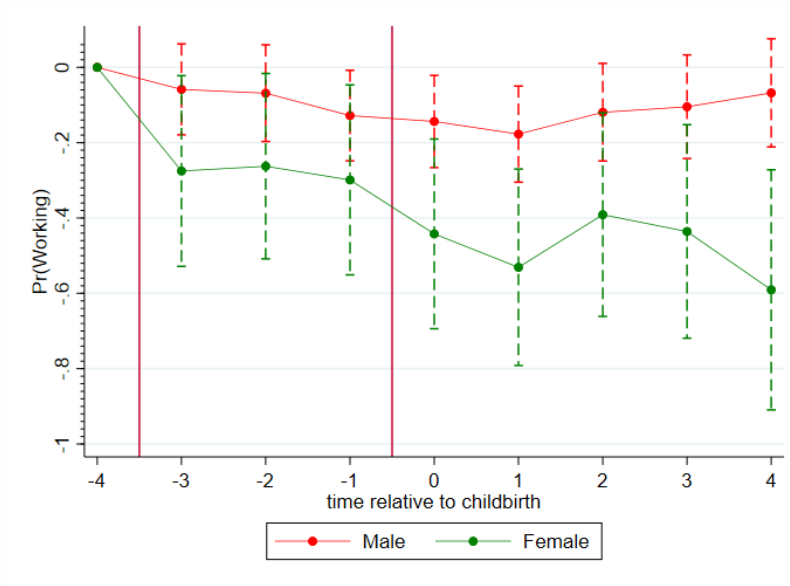
Figure 11: Effect of children of the heads of household on other household members

the labor force, and those in the informal sector have a 25 pp greater chance of becoming inactive. Nonetheless, women in the informal sector recover one year after birth, whereas the effect on those women in the formal sector persists at 4pp one year after birth.

Figure 12: Impacts of children in the short run on the probability of leaving the workforce
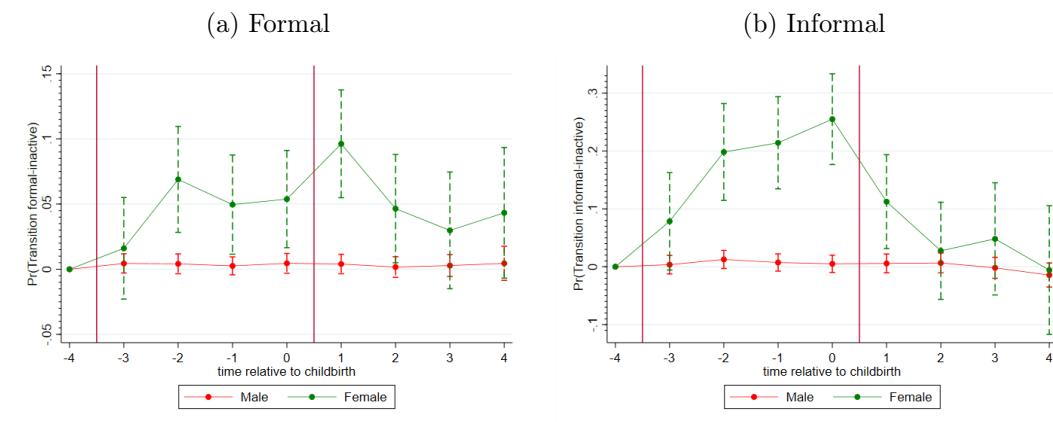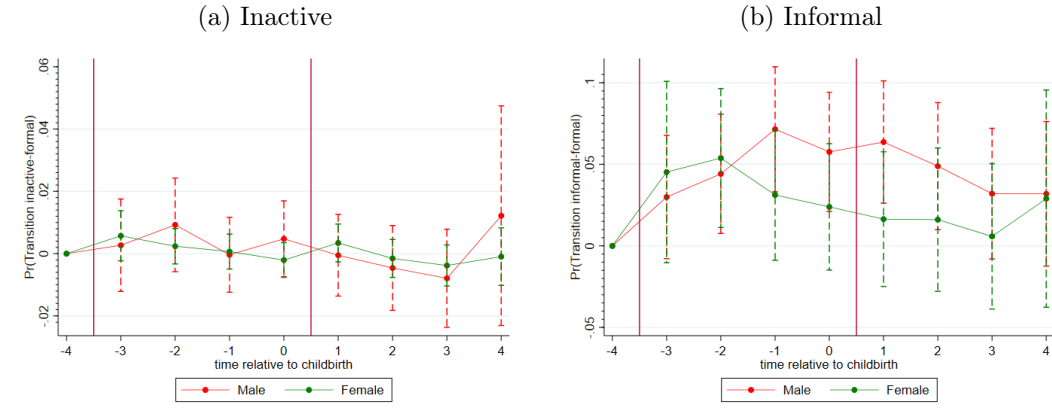
(a) Formal

(b) Informal

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children on men and women's probability of transitioning from employment to non-participation. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

We now turn to the probability of moving from the formal sector to either inactivity (Panel a of Figure 13) or the informal sector (Panel b). We do not find any statistically significant effect of childbirth on the probability of transitioning from inactivity to the formal sector for neither men nor women. In the case of a transition from the informal to the formal sector, we a positive and statistically significant effect for men during the period that covers two quarters before and after childbirth (an increase in the probability between 4 and 7 pp). In the case of women, we only observe a 5 pp statistically significant increase in the probability of going from the informal to the formal sector 2 quarters before the birth.
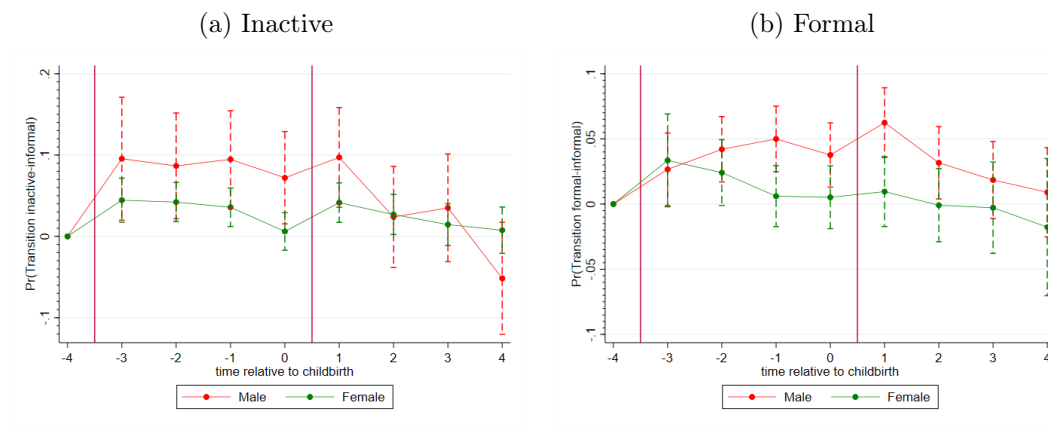
Figure 13: Impacts of children in the short run on the probability of transitioning to the formal sector

<center>(a) Inactive   (b) Informal</center>

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children on men and women's probability of transitioning to the formal sector from inactivity or the informal sector. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

Finally, we test whether the parents have a greater chance to move to the informal sector (Figure 14). Panel (a) shows the transitions from inactivity to the informal sector. We find that men are more likely than women (10pp vs. 4pp) to make this move around childbirth –from early in the pregnancy to the first quarter after birth. If women are indeed trying to find greater flexibility, we must see more women going from formal to informal jobs than men are. However, we do not find evidence that women have a higher chance to move from the formal sector to the informal sector. Women seem to value their job security more than men do, given than men do increase their chances of moving to the informal sector by about 4pp around childbirth. Thus, we do not have evidence in favor of the hypothesis that women may use the informal sector to take on more flexible jobs.

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Figure 14: Impacts of children in the short run on the probability of transitioning to the informal sector

(a) Inactive

(b) Formal

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children on men and women's probability of transitioning to the informal sector from inactivity or the formal sector. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

6.4 Robustness check: Instrumenting a child's arrival

A potential threat to our identification is that even if the exact timing of entry into parenthood may be exogenous, the overall decision to become parents is not. As a result, the identification of the effect of parenthood status is contentious. To address this endogeneity problem in parenthood status, we instrument the birth of a second child using the sex of the first child.

In the sex ratio's literature, demographers have long documented how some parents hold a preference for having children of both sexes (Ben-Porath and Welch, 1976; Gini, 1951), but also how there is a stronger preference on having a boy after this first offspring is a daughter (Almond et al., 2013). In the case of Mexico, Cruces and Galiani (2007) show estimates of sex preferences for couples who have two children of the same gender. Women who had two girls had a 4.3–4.6 pp higher probability

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of having a third child, while women who had two boys had a 2.5–2.8 pp higher probability of having a third child, which shows a bias in the preference for boys. Since children's sex is randomly determined, having a daughter as a first child should also increase the probability of having a second child in a way that is unrelated to unobservable factors that influence parents' labor market outcomes (Cools et al., 2017). Conditional on having one child, we define $female_1 = 1$ if the first child is a daughter. Hence we define the Z the following way:

$$X^T = \begin{bmatrix} t_{-4} & t_{-3} & t_{-2} & t_{-1} & t_0 & t_{+1} & t_{+2} & t_{+3} & t_{+4} \end{bmatrix}$$

$$Z^T = \begin{bmatrix} t_{-4} * female_1 & ... & t_0 * female_1 & ...t_{+4} * female_1 \end{bmatrix}$$

where $t_j = 1$ at calendar time t is equal to relative time j with respect to birth Table 3 shows that the first stage is relevant, with the sex of the first child generating a 1pp increase in the probability of having a second child. Table 4 shows the detailed first stage test statistics for all the time dummies instrumented.

The results show that the magnitude of the treatment effects is very similar for the IV specification and the OLS. These results, however, represent only the local treatment effect for the people who had a second child, unlike the OLS estimates. Hence, we keep the OLS estimates our main specification.

	(1)
	Birth in panel
Has daughter at first	0.0104***
	(0.000486)
Observations	601,101
R^2	0.022
F(1, 601035)	454.16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Fixed effects linear probability model for the probability of having a second child. Includes only parents with one child at the beginning of the panel

	F(8,598258)	P-val	AP Chi-sq(1)	P-val	AP F(1,598258)
t_{-3}	43.65	0.000	9.6e+08	0.000	9.6e+08
t_{-2}	96.12	0.000	4.4e+08	0.000	4.4e+08
t_{-1}	3.5e+07	0.000	2.7e+08	0.000	2.7e+08
t_0	221.29	0.000	1.9e+08	0.000	1.9e+08
t_{+1}	201.05	0.000	2.1e+08	0.000	2.1e+08
t_{+2}	163.24	0.000	2.6e+08	0.000	2.6e+08
t_{+3}	110.04	0.000	3.8e+08	0.000	3.8e+08
t_{+4}	54.29	0.000	7.7e+08	0.000	7.7e+08

Table 4: **Summary results for first-stage regressions**

(c) LFP

(d) Hourly wage
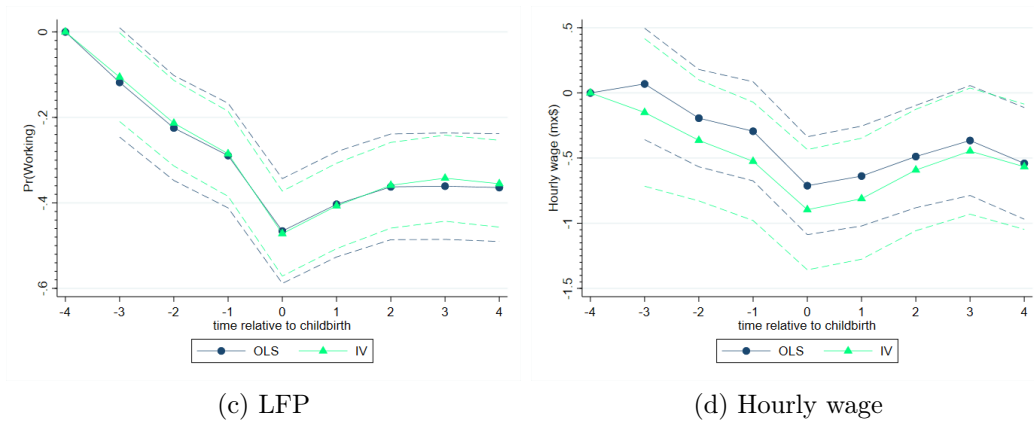
Figure 15: IV and OLS estimates for the impact of the second child on labor force participation
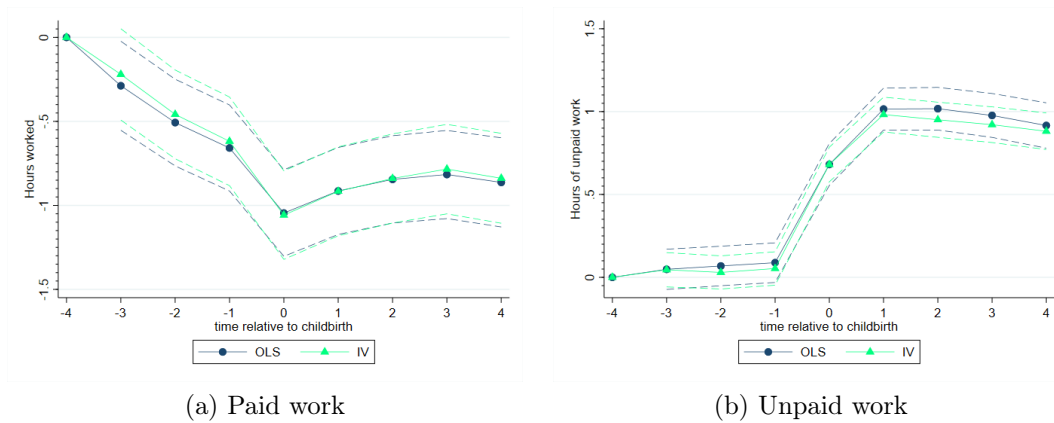

(a) Paid work

(b) Unpaid work

Figure 16: Impacts of children in the short run on weekly hours worked

7   Heterogeneity analysis

An important concern even after using the instrumental variable approach, is that even if the sex of the first child robustly increases the probability of having a child, and it does affect the timing of children by influencing the spacing of children as

shown in Section 6.4, it would probably still be rational for some women to time their births in response to career outcomes. If this was the case for a significant proportion of women then we would be overestimating the effect of children, since the timing of birth would be confounded with the timing of negative career events that are independent of children.

To explore whether selection is a mechanism driving our results, in this section we conduct heterogeneity analysis, under the following rationale: if negative career outcomes were driving most of the effect identified in our event study, then the effect would be concentrated on a specific population of women who time their births this way and would not be robustly significant across different education levels and income deciles. We acknowledge, however, that negative career outcomes are not the only explanation of observing this concentration of the effect on some subpopulations: differences in gender norms, family structures, family needs and other household characteristics may also be at play.

7.1   Education Level

Figure 17 shows the effect of children on women's labor outcomes by education level. We divided the population on those with less than 6 years of education (less than primary), between 6 and 8 years of schooling (completed primary), between 9 and 11 years of schooling (completed secondary), and more than 12 years of schooling (completed high school). Having a child has a negative impact on hourly wages, total income and the probability of working of women of all education levels. All women also increase their unpaid hours of work regardless of their educational background.

Figure 17: Impacts of children on various labor outcomes by education
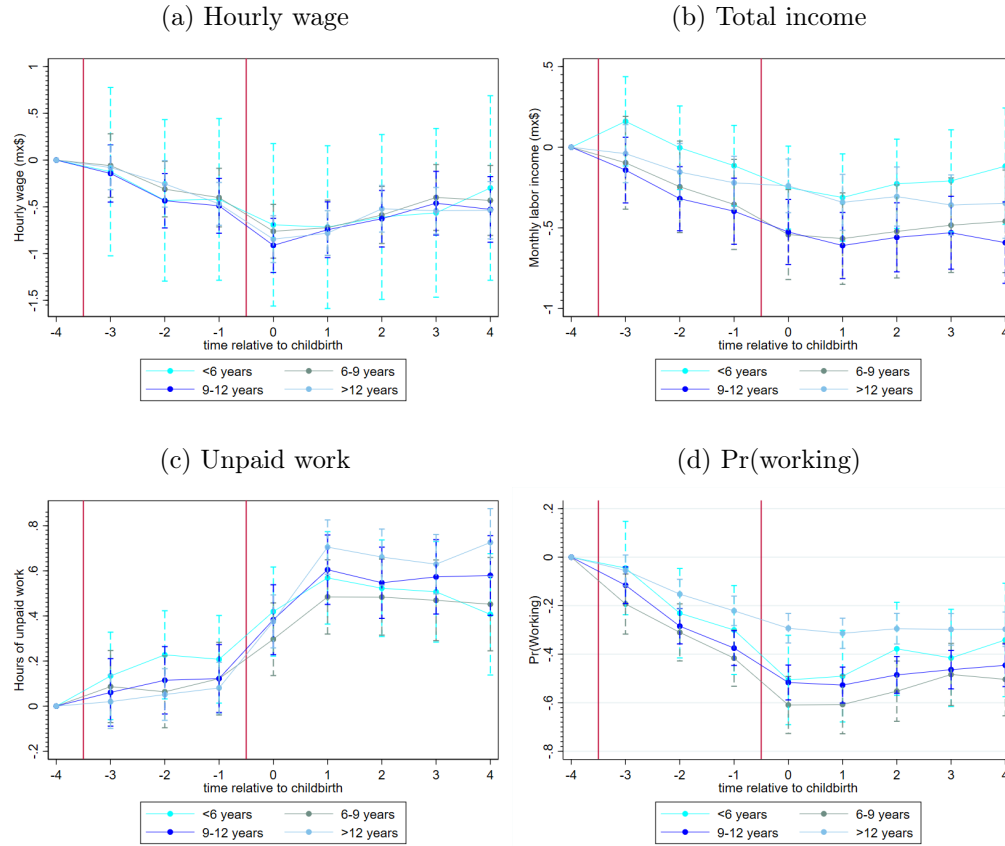
(a) Hourly wage

(b) Total income

(c) Unpaid work

(d) Pr(working)

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children women's work outcomes by education level. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

However, we do observe some differences in magnitude in panels (b), (c) and (d) in Figure 17. First, women with the lowest and highest schooling levels observe a lower impact on total income, than women in the middle of the education distribution (panel b). This is consistent with the findings in panel (d), in which we estimate that women with less than primary and high school or more have a lower chance of dropping from the labor market. These women are presumably those with the lowest

and highest income levels. As such, our results would be consistent with Goldin's U shaped relationship between income and participation at a micro-level analysis (Goldin, 1995). Finally, in panel (c), we find that women with more education increase their unpaid work by slightly more than women with less education, though none of the differences here are statistically significant.

7.2   Heterogeneity in labor market outcomes: a quantile regression analysis

In this section we estimate the effect of parenthood in the 10th to 90th percentile of the conditional distribution of on participation, wage and time use trajectories of women that were working at the beginning of the panel. In the figures 18-21 Panel (a), we use as counterfactual all the women to evaluate the role of selection into childbearing. In figures 18-21 Panel (b), we compare only among women who have children at some point of the panel.

Figure 18 presents the effect of childbirth on female labor force participation. First, we find that before pregnancy, women display Goldin's U-shaped (Goldin, 1995) relationship between participation and income (see Panel (a)): about 40% of women in the first decile participate; then participation drops very quickly toward zero in deciles 2, 3 and 4; and from the fifth decile on participation begins increasing until it reaches about 57% in the highest decile. However, the impact of both pregnancy and childbirth is mostly borne by those women at the extremes of the income distribution (see Panel(b)). Women in the middle of the distribution exhibit a much smaller effect of children on labor force participation. This is not consistent with the results on Panel (d) in Figure 17, which suggest that the education levels shown in the graph are not as related to income as we expected, or that Goldin's U does not necessarily apply to changes in participation due to childbirth.

Figure 18: Quantile regressions of the impact of children on women's labor force participation.
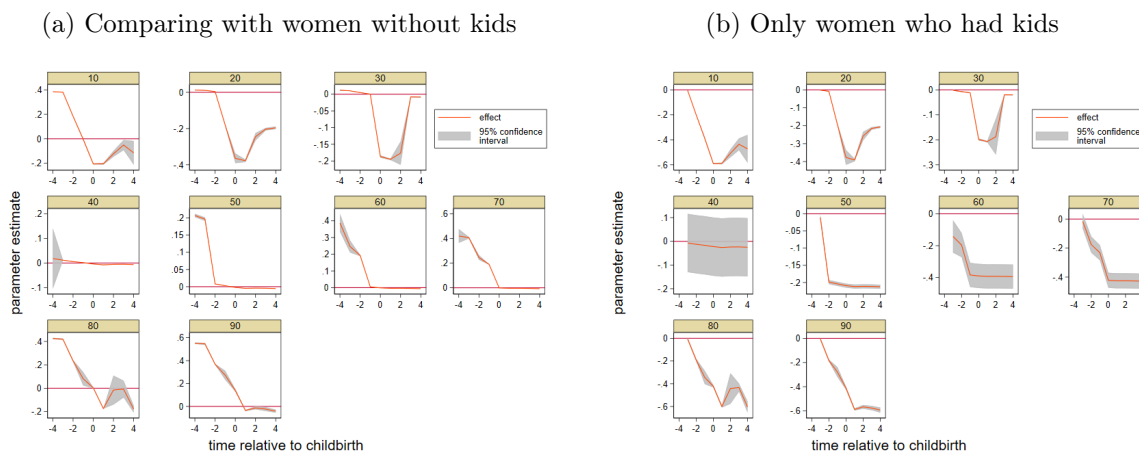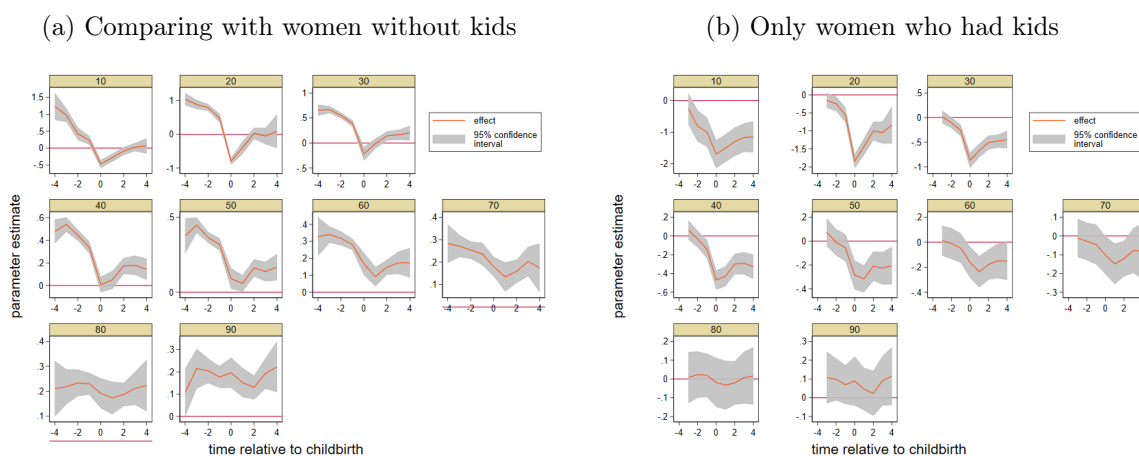
(a) Comparing with women without kids

(b) Only women who had kids

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children women's labor force participation by income decile. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

Comparing across figures in this section, an interesting result is that while women start strongly positively selected in terms of hours worked and hourly wage, the positive selection is very limited and not robustly significant throughout the distribution. This displays interesting results in terms of women's preferences for housework and care-taking: before having children, women who had children were not devoting much more time to housework than women without children. A notable exception are the top two deciles of the distribution, in which we can see clearly how women reduce their unpaid work throughout pregnancy, potentially as a form of preventive or prescribed rest during the late months of pregnancy and because they can substitute their own unpaid work with hired home-care.

When we compare between panels of each figure, we can see that the effects captured by the event study are are robust to the sample selected. However, when we compare across deciles, we observe that the effects on hourly wage and hours of

paid work vary drastically along the distribution. The effects on hourly wage are concentrated on the lower and middle sections of the distribution. For women in the top two deciles, the effect on wages is not statistically significant. It is important to point out that this is the short-run effect and the long run effect on wages of women at the top of the distribution might be different, especially since the women who work the most paid hours are the ones that never recover to their previous paid work load.

Figure 19: Quantile regressions of the impact of children on women's hourly wage.

(a) Comparing with women without kids   (b) Only women who had kids
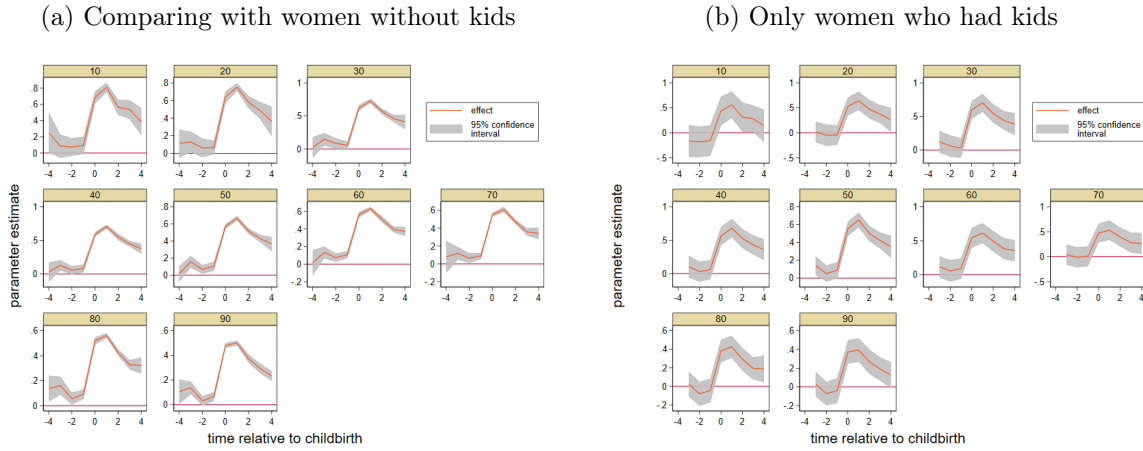

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children women's hourly wage by income decile. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

Figure 20: Quantile regressions of the impact of children on women's hours worked.
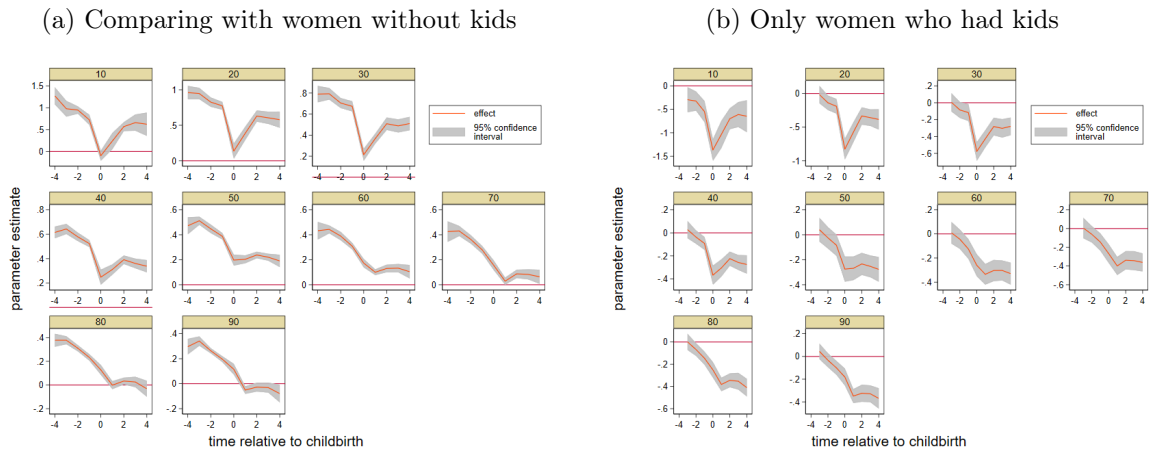
(a) Comparing with women without kids

(b) Only women who had kids

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children women's hours of paid work by income decile. This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

Figure 21: Quantile regressions of the impact of children on women's hours of unpaid work.

(a) Comparing with women without kids

(b) Only women who had kids

Notes: Authors' estimates using ENOE quarterly data from 2005 to 2019. The graph shows the percentage point impact of children women's hours of unpaid work by income decile This impact is defined by the coefficients α_{js} defined in Equation 1. The estimates are calculated conditional on working at the beginning of the period. The X-axis represents quarters before and after childbirth.

8 Conclusion

This study aims to estimate the child penalties in the Mexican labor market. Our results show a strong impact of childbearing on the labor market outcomes of women. To explore several scenarios, we tested different specifications on our analytic sample that included working prior to the pregnancy, continuous employment throughout, and flexible specifications on pre-birth and post-birth employment. We find that women start dropping out of the labor force before childbirth and throughout the pregnancy, with the highest decrease right at childbirth. Once the child is born, the participation decreased some women return to work post-birth, however, the participation rates remain at a lower level compared to pre-birth means. Even more, almost half of the women who were initially working drop out of the labor force entirely. The arrival of a child also has a negative effect on wages and monthly

earnings even before the birth of the child, however, post-childbirth gender differences in labor income variables are not statistically significant. An accompanying increase in unpaid work hours for women, further increases the gap in labor market outcomes between men and women. Lastly, we find no evidence of women's preference for the informal sector as a fall out option post-birth, which might signal that women may value job security over flexibility.

A contentious discussion on the endogeneity of parenthood surrounds this literature. To address this concern we instrument the gender of the first child on the gender of the second child, exploiting an exogenous source of variation in the decision of having children and our specification is robust. All results put together show that women do experience a child penalty in the Mexican labor force at the extensive and at the intensive margin, a decline in wages and labor income is also observed, and what further delays the recovery of all labor market outcomes for women is the wide gap in unpaid hours and care. This study provides further evidence that once women have children the balancing act of career and home responsibilities becomes more challenging. And that gendered patterns in household work disproportionately affect working women.

Finally, to uncover heterogeneity in the effects we also estimated the effect of children by income decile. We find that the effect of childbirth on wages is mostly borne by low-income women. For the 8th and 9th income deciles, the effect on wages is not statistically different from zero. In contrast, almost all women experience a decrease participation and hours of work, and an increase in unpaid labor, though the magnitude of the effect and its trend over time exhibit heterogeneity by income deciles. For instance, hours of work tend to recover a little after childbirth for women below the median income, but we do not find such a strong recovery for women above the median income. Unpaid work smaller increase for women in the 8th and 9th income decile, but the magnitudes are not strikingly different, which suggests that women exhibit similar preferences for unpaid labor after childbirth.

We contribute to this literature by being the first to document the child penalty in

Mexico and among a few paper to document child penalties in a developing county, where the economic setting is very different. We are also the first to show the impact of children on members of the extended family, and find significant effects, and we also directly show the shifts from hours at work to hours in unpaid labor at home. We are currently working on several extensions and mechanisms, which include exploiting self-reported differences reasons for leaving the workforce, as well as sector-level and occupation-level analysis to examine the role of flexibility. Our second aim is to uncover the household conditions, preferences and policies that affect the child penalty. Our final objective of this research agenda is to be able to make policy recommendations regarding the promotion of women's work in Mexico.

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