ASOCIACION ARGENTINA
DE ECONOMIA POLITICA

ANALES | ASOCIACION ARGENTINA DE ECONOMIA POLITICA

LIII Reunión Anual

Noviembre de 2018

ISSN 1852-0022
ISBN 978-987-28590-6-0

Motherhood and the Missing Women in the Labor Market

Edo, María
Berniell, Lucila
Berniell, Inés
De la Mata, Dolores
Marchionni, Mariana

Motherhood and the Missing Women in the Labor Market

Inés Berniell
CEDLAS-Universidad Nacional de La Plata

Lucila Berniell
CAF – Banco de Desarrollo de América Latina

Dolores de la Mata
CAF – Banco de Desarrollo de América Latina

María Edo
Universidad de San Andrés and CONICET

Mariana Marchionni
CEDLAS-Universidad Nacional de La Plata and CONICET[1]

Abstract

Motherhood currently stands out as a key determinant of the gender gap in labor market outcomes. Studies identifying the effect of children have mostly focused in Europe and the US. These results may not be extrapolated to developing countries with different institutional settings and cultural norms. In this paper we estimate the impact of becoming a mother on various labor outcomes in Chile. Following an event-study methodology we show that motherhood implies a drastic reduction in earnings, explained by a drop in labor supply, both in the extensive and intensive margins. These changes persist even ten years after the first child is born. No child penalties are found for fathers, neither in the short nor in the long run. The results for mothers are driven by a decline in formal employment, leading to an increase in informality rates among them. Finally, we find that effects are stronger for less educated mothers, indicating that education is a buffer for this type of child penalty. Our results suggest that mothers find in the informal sector the flexibility to cope with both family and labor responsibilities, although at the cost of resigning contributory social protection and reducing on-the-job skills accumulation.

*JEL Code***:** J13, J16, J46.

Keywords: gender pay gap, child penalty, developing countries, labor informality, Chile.

[1] We are grateful to Leopoldo Tornarolli for helpful suggestions. Corresponding author María Edo: mariaedo@gmail.com. Views expressed in this work do not necessarily correspond to those of the authors' affiliations.

1. Introduction

The last century has witnessed unprecedented progress for women around the world. Improvements in the areas of political and social rights, access to education and the labor market have generated a profound transformation of the role of women in society. Despite this notable convergence of men's and women's roles, some gaps remain considerable. In particular, issues regarding labor supply, earnings and wage rates still show substantial differences between genders.

Several factors have been identified in the literature regarding the generation of these gaps, from pure discrimination and differences in human capital accumulation (Altonji and Blank, 1999), to differences in other characteristics of men and women such as their degree of risk aversion, competitiveness and negotiation skills (Dohmen *et al.*, 2011; Niederle and Vesterlund, 2007; Buser *et al.*, 2014).[2] Given the gender convergence in educational attainment as well as the small role studies assign to differences in psychological traits (Blau and Kahn, 2017), motherhood currently stands out as one of the key factors driving the gender gap in the labor market as the greatest burden of childcare still falls on mothers (Blau and Kahn, 2006). In fact, Kleven *et al.* (2018) show that while motherhood accounted for 40% of the gender gap in earnings and wages in Denmark in 1980, by 2017 almost 80% of the remaining inequality may be attributed to children. Similarly, Kuziemko *et al.* (2018) find that motherhood causes a sharp reduction in women's labor force participation in other developed countries (the UK and the US), and that the effect persists for several years after the birth of the first child.

Our goal is to contribute to this discussion with evidence for a developing country, Chile. Providing evidence on the effects of motherhood in a developing country can be very important for a number of reasons. Developing countries have weaker (*de facto*) labor regulations to balance work and life, lower rates of female labor force participation, higher informality rates, and an inadequate supply of public childcare services. According to the OECD Online Employment Database (OECD, 2012), the female labor force participation rate in Chile is much lower (66%) than in the US, the UK and Denmark (74.5%, 79% and 85%, respectively). Chile is not only a country with public childcare and work-life balance policies that are much less generous than in the developed world, but also a country that concentrates a larger share of employment in the informal sector.[3] More importantly, in Chile there is a gender gap in informality, as the share of female workers in informal jobs is 30% higher for women (SEDLAC, CEDLAS and The World Bank). These differences provide yet another interesting dimension to the analysis, certainly absent when focusing in highly developed countries.

Although several studies have analyzed the effects of an additional child –i.e. the intensive margin of fertility- on mother's labor outcomes in developing countries, to the best of our knowledge no one has yet been able to identify the causal effect of becoming a mother -i.e. the extensive margin of fertility.[4] In this context, this paper aims at identifying the

[2] It is clear, however, that these differences in characteristics could derive, in turn, from the roles culturally assigned to women and men (Bursztyn *et al.*, 2017).

[3] The incidence of labor informality (i.e., share of workers not contributing to social security) is around 32% in Chile (Tornarolli *et al.*, 2014). Therefore, the size of the informal sector is much higher than in developed countries, although it is among the lowest for Latin American countries.

[4] Several studies for developed countries have assessed the causal effect of children on women's labor outcomes. The first strategies advanced in the literature were focused on the intensive

causal short and long-term impacts of motherhood on women's labor market outcomes in Chile based on an event-study approach around the birth of the first child.

The event-study approach allows treatment effect estimation when all units in the panel receive treatment but at random times. In our setting, this quasi-experimental methodology allows overcoming the problem of endogeneity of fertility under the identification assumption that the timing of child's birth is not correlated with labor outcomes conditional on having a child during the observation period and on the included controls. In other words, the timing of the event is assumed to be orthogonal to the unobservable determinants of labor outcomes, which should change smoothly over time (Bertrand, 2018; Kleven *et al.*, 2018; Kuziemko *et al.*, 2018). Therefore, the event-study approach allows tackling the usual concerns related to selection issues when studying the effects of children on labor outcomes, i.e. women with children may be different to the rest of the population in many aspects and their labor market outcomes would have been different from other groups even in the absence of children. As we will discuss later on, the absence of trends in labor outputs prior to the birth of the first child lends support to this key assumption.

Our analysis is based on panel data from the Social Protection Survey carried out by the Ministry of Labor and Social Protection in Chile between 2004 and 2016. Since the survey includes recall questions on labor market outcomes and contains the exact dates of children's births, we can follow labor trajectories of individuals in a time-window covering 5 years before the birth of the first child and up to 10 years after.

Our results show that becoming a mother implies a sharp decline in women's total earnings: after the birth of their first child mothers' earnings fall by around 20-30%. This reduction in earnings arises from changes in labor supply, both in the extensive and intensive margins: women's labor force participation and employment decline by 20% and 17%, respectively, hours worked fall by 4-5% and employment in part-time jobs increases by 40%, while the evidence regarding hourly wages is not conclusive. All of these drastic and strong effects remain relatively stable in the long run. Conversely, the birth of the first child does not seem to affect fathers in any of these outcomes.

We also explore possible mechanisms behind these strong impacts of motherhood on total earnings. In particular, we assess whether after the first child women move to more family-friendly occupations, such as those in the public sector, and whether they move from formal to informal jobs which can offer greater labor flexibility allowing for a better work-life

---

margin: Rosenzweig and Wolpin (1980) were the first to introduce the 'birth of twins' as an instrument to identify the impact of having a second child while Angrist and Evans (1998) proposed the 'same sex siblings' as an alternative instrument to provide exogenous variability of fertility. More recently, the literature has focused on 'infertility shocks' as possible instruments (Lundborg *et al.*, 2017; Cristia, 2008), allowing for identifying the effect of becoming a parent –i.e., the extensive margin of fertility. The evidence for developing countries is still scarce. Regarding the intensive margin, De Jong *et al.* (2017) have relied on the 'twins at first birth' instrument for sub-saharian Africa while Orbeta (2005) has done so for the Philippines. Cruces and Galiani (2007) and Tortarolo (2013) have used the 'same-sex siblings' instrument for several Latin American countries. To the best of our knowledge, Agüero and Marks (2011) is the only study focused on the extensive margin in the developing world. Based on 'intertility shocks' the authors evaluate the effect of having a first child in 6 Latin American countries (Peru, Guatemala, Colombia, Bolivia, Nicaragua and Dominican Republic). They find no evidence that children have a causal effect on the labor force participation of women.

balance. We find no statistically significant changes after motherhood in the probability of working in the public sector. However, we do find that motherhood causes a drastic and persistent drop in women's probability of having a formal job while, except for the months adjacent to the birth of the first child, the probability of having an informal job remains unchanged. In other words, the fall in employment after motherhood is explained by a decline in formal employment only.

Interestingly, our results are in line with the literature that suggests that workers' ability to switch from the formal to the informal labor market attenuates the negative impact of shocks on employment.[5] Likewise, the flexibility implied by informal jobs (e.g. more flexible working hours, a feature that is crucial to balance work and family) would allow women to cope with the negative shock associated to motherhood, thus preventing exits from the labor market. It is important, however, to bear in mind that this flexibility comes at a high cost for women: resigning contributory social protection as well as a plausible depreciation or lack of accumulation of some skills that are valuable in the formal sector of the economy.[6] These costs may in part explain the persistence of poor labor market outcomes for mothers even long after having their first child.

Finally, we explore whether these effects differ across education groups. Even though we find that motherhood has a negative impact on labor outcomes regardless of the educational level, the effects are smaller for more educated mothers. This suggests that education protects women from the negative effects of motherhood on labor outcomes, but it is not enough to counteract them.

Our work contributes to the literature in several ways. In the first place, to the best of our knowledge, we are the first to provide causal evidence on the negative impact of becoming a mother on labor outcomes in the short and long run for a developing country. Secondly, our results offer insight regarding possible mechanisms driving the effects of motherhood, in particular whether the informal sector acts as a buffer against the negative shock in employment. Furthermore, this may offer a partial explanation of the gender gap in informality found in Chile. Finally, we show whether certain baseline characteristics such as education protect women from the negative effects of motherhood.

The rest of the paper is organized as follows. Sections 2 and 3 briefly describe the data and methodology. Section 4 presents the main results while the following section explores possible heterogeneities. The last section provides some final comments and points towards further research.

2. Data

Our analysis is based on longitudinal data from the Social Protection Survey (SPS), carried out by the Ministry of Labor and Social Protection in Chile. The SPS consists of 6 waves gathered between 2002 and 2016 following around 16,000 individuals in each

[5] For example, Dix-Carneiro and Kovak (2017) and Ponczek and Ulyssea (2018) study the role of the informal sector as a buffer against negative macroeconomic shocks, such as changes in trade policy or labor regulations.

[6] Berniell and de la Mata (2016) summarizes evidence of the cost implied by long spells of informal employment on skills accumulation.

wave.[7] We use data from the 2004 wave onwards. The 2002 sample is not representative of the Chilean population aged 18 years and older: it only includes affiliates to the Pension System, i.e. informal workers are not represented.

The survey includes demographic and socioeconomic information at the individual and household level. More importantly for our purposes, the survey recovers labor market trajectories since individuals turn 15 years old and it contains the exact dates of children's births, which allows for studying the dynamics of labor outcomes for individuals who become parents within the sample window. Even though life history interviews typically suffer from recall bias, the SPS mitigates this problem by asking individuals about their labor market trajectories in more than one wave. To reduce recall bias we use information on the closest report and restrict the analysis to labor outcomes from the year 2002 onwards.

Our goal is to estimate the effect of motherhood on labor outcomes based on an event study approach around the birth of the first child (Kleven *et al.*, 2018; Kuziemko *et al.* 2018). To that aim, we define the 'event' as the month of birth of the first child. We restrict the sample to mothers whose age at first childbirth is between 18 and 50 years old, and to fathers whose age at first childbirth is between 18 and 60 years old. Individuals in the sample are observed at least once before childbirth and at least once after, resulting in an unbalanced panel of 3228 women and 2740 men.

The event study analysis requires that we define time units relative to the date of birth of the first child. Therefore, for each individual *i* in our sample, E_i denotes the calendar month in which he/she became a parent and $e_{it} = t - E_i$ is the number of months since (or until) birth. Letter τ indexes time (in months) relative to the child's birth or 'event time': τ equals zero in the month of birth and takes on negative (positive) values in pre-child (post-child) months. In our sample τ runs from -60 (five years before) to +120 (10 years after).

We estimate the effect of having the first child, henceforth 'motherhood effect', on: i) total earnings, ii) labor force participation, iii) employment, iv) hours worked, v) part-time employment, vi) hourly wages, vii) employment in the public sector, viii) employment in the formal sector, and ix) employment in the informal sector. Appendix A provides the detailed definitions of the outcomes. It is important to note, however, that the long-term effects on these outcomes may include not only the impact of becoming a mother but also the effect of subsequent children.

3. Methodology

In this paper we estimate the impact of children on mothers' labor outcomes based on an event study approach around the birth of the first child. This quasi-experimental methodology allows treatment effect estimation when all units in the panel receive treatment but at (as-good-as) random times. In our case, the event study methodology allows overcoming the problem of endogeneity of fertility with the key identification assumption that the timing of the child's birth is not correlated with labor outcomes, conditional on having a child during our observation period and on the included controls. In

[7] The specific waves were in the years 2002/03, 2004/05, 2006/07, 2008/09, 2012/13, and 2016.

other words, the timing of the event is assumed to be orthogonal to the unobservable determinants of labor outcomes, which should change smoothly over time.[8]

It is possible to think of two different effects of motherhood on labor outcomes. One is the effect of anticipated fertility prior to the birth of the child -the pre-child effect-, and the other is the effect of children on mothers' labor outcomes after the actual birth of the first child -the post-child effect. While the event study methodology allows identifying the latter, it does not allow for the identification of the former, which determines the pre-child levels of the outcomes. For instance, suppose that women decide to invest less in education in anticipation of motherhood; the event study not only does not capture this pre-child effect but also the post-child effect we are able to capture will be a lower bound of the total effect of children on mothers' labor outcomes.[9]

Consider a panel of *i=1,…N* individuals observed for all or some *t=1,…T* calendar periods (months). As we mentioned in the data section, in our sample each individual has his/her first child in calendar time E_i and $e_{it} = t - E_i$ is the number of months that has passed since the birth of the child. We model outcome *Y* for individual *i* in calendar time *t* as:

$$Y_{it} = \sum_{\tau \neq -12} \beta_\tau . I(e_{it} = \tau) + \sum_j \gamma_j . I(j = age_{it}) + \delta_t + \varepsilon_{it} \quad (1)$$

The first term consists of a set of event time dummies. The event time coefficients $\beta_\tau s$ for $\tau \geq 0$ capture the post-child dynamic effects, i.e. the effects of parenthood on outcome Y for each period τ after the birth of the first child. Since the omitted category corresponds to $\tau = -12$, the coefficients measure the impact of children relative to the year before they are born, i.e. relative to the same month of the previous year. The coefficients $\beta_\tau s$ for $\tau < 0$ capture pre-trends, i.e. trends on outputs prior to the birth of the child. The following terms include non-parametric controls for age (one dummy variable for each age-in-years cohort) and calendar year and month fixed effects (denoted just by δ_t to keep the notation simple). We estimate model (1) for mothers and fathers separately.
As in Kleven *et al.* (2018), we present our results as the percentage effect relative to the counterfactual outcome without children. Formally, the percentage effect for each event time τ is given by $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ where $\tilde{Y}$ is the average predicted outcome across *t* from model (1) when omitting the event time terms.[10]

Most outcomes are unconditional, but hours worked, part-time employment and hourly wages are conditional on being employed, so we must be more cautious with the causal interpretations since our estimates may also capture selection effects. However, if individuals were positively selected into employment, our estimates would be a lower bound of the impact of the first child on these labor market outcomes.

To interpret the event time coefficients as the causal effect of child birth would require the key identification assumption that the timing of the event is not correlated with outcome Y

[8] While the identification of short-term effects relies on the smoothness assumption, the identification of long-term effects requires stronger assumptions. Moreover, long-term effects will capture the impact of children born after the first child. See Kleven *et al.* (2018).

[9] Appendix B in Kleven *et al.* (2018) provides a more detailed and formal discussion regarding this point.

[10] While in the figures that show our main results effects are expressed in percentages, the tables in Appendix A report the event time coefficients' estimates $\hat{\beta}_\tau$ in levels.

conditional on having a child during our observation period and on the included controls. One way to gain credibility on this assumption is by examining trends in labor outputs prior to the birth of the first child. The presence of pre-trends would call into question the validity of the assumption. For instance, if women's employment falls before child's birth, it may be that women decide to have children when faced with job loss. Instead, the absence of pre-trends lends support to the assumption that outcomes do not respond before the child is born. As we will see in the next section, estimated β_τs provide a visual test that suggests the absence of pre-trends. [11]

4. Main results

In this section we present in figures the evolution of labor market outcomes before and after the birth of the first child, which result from the estimation of equation (1) for mothers and fathers separately. Point estimates for every event time □□should be interpreted as the difference in the value of the outcome of interest between that period and □□□□□□□, i.e. the year just before the birth of the first child. As explained in the previous section, instead of the event time coefficients' estimates $\hat{\beta}_\tau s$, the figures show the percentage effect relative to the predicted counterfactual outcome without the impact of the birth of the first child. Additionally, the figures include the 90% confidence intervals for each point estimate.[12] The detailed estimation results are reported in the tables in Appendix B.[13]

Impacts on earnings, labor supply, and hourly wages

Figure 1 presents the gender-specific impact of the birth of the first child on total earnings (after taxes and excluding transfers, in constant Chilean pesos) across event time. We observe that earnings evolve almost parallel for men and women before they become parents, but the trajectory for mother changes dramatically after the first child is born. Moreover, the gap that opens between mothers and fathers' earnings immediately after the birth of the first child never closes: the impact of the first child is negative and statistically significant for women but not for men during all months in the post event period. This drastic reduction for mothers starts during pregnancy and persists after birth, implying a reduction of around 20-30% of earnings, which remain relatively stable over the 10 years following the birth of the first child.

The impact on earnings may arise from changes in labor supply (both in the extensive and intensive margins) and changes in hourly wages. For all the outcomes in Figures 2.a to 2.d (labor supply) and Figure 3 (hourly wages) the trajectories of women and men are parallel

[11] Note that our model (1) does not include individual fixed effects. The reason is that age, calendar time fixed effects and individual fixed effects are not independently identified in this setting, a problem similar to the well-known age-cohort-time problem that arises because for a given calendar time, if we know when a cohort was born we can infer its age. See Chapter 2.7 in Deaton (1997) for a thorough discussion and examples of this problem. In formal terms, when the event study model includes individual fixed effects together with calendar time fixed effects, the event time effects are identified only up to a linear trend. In other words, the β_τ coefficients in a model with individual fixed effects fit the data as well as $\beta_\tau + c.\tau$ for any constant c. See Borusyak and Jaravel (2017).

[12] We find similar results using the Chilean Casen Panel Survey, a shorter panel covering only a 4-year period from 2006 to 2009. Results are available upon request.

[13] All tables in the Appendix B report coefficients as they come out from the estimation of equation (1). All point estimates in the figures of this section can be computed adjusting those coefficients with the predicted counterfactual value without the impact of the event that are reported at the bottom of the corresponding table.

in the pre-child period, and men do not experience any important change after becoming fathers. However, women's trajectories of labor supply start diverging immediately after motherhood: their labor force participation and employment decline by 20% and 17%, respectively (Figure 2.a and 2.b), and hours worked fall by 4-5% (Figure 2.c). Consistent with this last finding, the share of employed women that report working in part-time jobs increases by 40% after the birth of the first child (Figure 2.d). Importantly, these sharp and strong effects persist in the long run. Finally, Figure 3 shows a slight decrease in the hourly wage only after 60 months, but these effects are small and not statistically significant. However, since this result is conditional on being employed, we cannot rule out biases due to selection. If we are willing to consider a positive selection-into-employment effect after motherhood, our result is consistent with the existence of a negative causal effect of motherhood on hourly wages.[14]

Our results differ in several ways from recent findings for developed countries. First, while the evidence suggests that in a country like Denmark (Kleven *et al.*, 2018) the three margins (employment, hours worked and wage rate) contribute to explain the reduction in earnings for women after the birth of children, our evidence supports an effect via both the extensive and the intensive margins of labor supply but it is not conclusive regarding the effect on hourly wage. Second, the negative effect on mother's employment that we find for Chile is larger than the 12%-drop that Kleven *et al.* (2018) estimate for Denmark, which could be expected on the basis of the greater access of Danish families to public policies for work-life balance (e.g. child-related leave and publicly subsidized formal care and education services) and because of a much higher labor market attachment of Danish women. In fact, female labor force participation in Denmark is one the highest among OECD countries according to the Online Employment Database (OECD, 2012): it reached 85% for adult women aged 25 through 54, 20 percentage points higher than for Chilean women in the same age group.

With these arguments in mind, however, it seems paradoxical that the negative effects of motherhood on employment are lower in Chile (20%) than in countries such as the US and the UK, where Kuziemko *et al.* (2018) find that mothers' employment falls between 40% and 50% after their first child is born. Particularly striking is the difference between Chile and the UK if we consider, for instance, that the generosity of public family benefits is much larger in the latter according to the OECD Social Expenditure Database. At least two explanations to this apparent contradiction come to our minds. One likely explanation is that given that family policies are less generous in Chile than in the UK, many Chilean women who want to become mothers are discouraged to enter the labor markets in the first place. Hence, Chilean women who do participate are likely to be those more attached to the labor force and less likely to leave it once they become mothers. Another explanation is that the higher incidence of labor informality in developing countries such as Chile acts as a buffer against negative shocks to employment. In what follows we analyze the effects of motherhood on occupational choices and further elaborate on the informality hypothesis.

Impacts on occupational choices and the role of the labor informal sector

There is a growing body of evidence showing that occupational choices of women with children take qualitative characteristics of jobs that favor family-work balance into account (e.g. Goldin, 2014). However, there is little evidence showing a causal link between

[14] Blau and Kahn (2017) summarize the existing evidence on women's selection into employment in several developed countries. The weight of the evidence supports a positive selection on wages.

motherhood and choosing a family-friendly occupation, such as part-time jobs or employment in the public sector. One exception is Kleven *et al.* (2018), who find that Danish women are 12% more likely than men to work in the public sector as a result of parenthood.[15] We investigate this occupational choice mechanism for Chile in Figure 4, where we find no statistically significant changes after parenthood in the probability of working in the public sector, neither for fathers nor for mothers.

One crucial aspect in which the Chilean labor market differs from that of developed countries is the existence of a relatively large informal sector. Despite being one of the Latin American countries with the lowest incidence of labor informality (Tornarolli *et al*., 2014), 31.7% of all workers in Chile had informal jobs in the late 2000s, that is, they had no access to social protection linked to employment. More importantly, informality is more common among female workers. For instance, according to SEDLAC (CEDLAS and The World Bank), the share of female workers in informal jobs was 35.5% in Chile in 2009, more than 6 percentage points higher than that for male workers in the same age group -between 20 and 60 years old-. The gender gap in labor informality is even larger among salaried workers, with 25.1% of women and 17.3% of men in informal jobs. On the one hand, informal jobs are considered low-quality or precarious jobs since they do not guarantee certain benefits for workers (labor legislation rights, social security). On the other hand, informal employment can offer greater labor flexibility in the face of negative shocks to employment. This channel has been extensively studied in the literature that focuses on the impacts of macroeconomic shocks on labor markets, such as changes in trade policy or labor regulations (Dix-Carneiro and Kovak, 2017; Ponczek and Ulyssea, 2018). The evidence from this branch of studies suggests that workers' ability to switch from the formal to the informal labor market attenuates the negative impact of these shocks on employment. Likewise, the flexibility implied by informal jobs (e.g. more flexible working hours, a feature that is crucial to balance work and family) would allow women to cope with the negative shock associated to motherhood, thus preventing exits from the labor market.

In Figures 5 and 6 we explore the effects of the birth of the first child on the choice of formal versus informal jobs. Figures 5.a and 5.b show that while formal and informal employment are parallel for women and men before the first child is born, there is a drastic and persistent drop afterwards only in women's probability of having a formal job. Importantly, except for the months adjacent to the birth of the first child, mother's informal employment does not change over time. These results imply that, conditional on employment, the probability of working in the informal sector increases for mothers and not for fathers after the first child is born, as we show in Figures 6.a and 6.b. In other words, the fall in employment after motherhood is explained by a decline in formal employment only.[16]

[15] They also find that mothers are 20% less likely than fathers to become a manager, which is often associated with longer working hours.

[16] There are two types of transitions across occupations that are consistent with this pattern. First, the share of informal workers among women remains fairly constant because most women who had an informal job in the pre-child period return to the informal sector after their first child is born. In this case, the decline in female employment is basically explained by former formal workers leaving the market. Figure 5.a is also consistent with a change in the composition of the group of women working in the informal sector: some of the women who had formal jobs in the pre-child period switch to the informal sector afterwards, while some women previously working in the informal sector leave the labor force.

At this point it is important to mention that the flexibility offered by occupations in the informal sector comes at the cost of resigning contributory social protection, and importantly for our analysis, at the cost of a plausible depreciation or lack of accumulation of some skills that are valuable in the formal sector of the economy. These costs may in part explain the persistence of bad labor market outcomes of women many years after motherhood, as shown in Figures 1 to 5.

5. Heterogeneous impacts of motherhood on labor outcomes

According to the results described so far, motherhood causes a large and persistent drop in women's labor supply in Chile. In this section we investigate whether certain characteristics of women associated with their labor market attachment such as education, provide some sort of protection against the motherhood effect. In Figure 7 we present the heterogeneous responses of earnings according to the education level (women with some college education versus women who never went to college). The figure indicates that both less and more educated women experience a decrease in their earnings after motherhood, but these effects are larger for the less educated, although the difference is not always statistically significant.

Figures 8.a to 8.d show that education attenuates the effects of motherhood both in the extensive and intensive margins of labor supply. While the drop in labor force participation and employment is around 25% and 30%, respectively, for the less educated women, this drop is just 10% and 12%, respectively, for the more educated women (Figures 8.a and 8.b). More education also reduces the effect of motherhood on the number of hours worked and on the probability of being in a part-time job. Figures 8.c shows that, conditional on working, less educated women work 5% less hours relative to the pre-child period, and that this reduction persists and even becomes slightly larger in the longer run. Consistent with this, the probability of working in a part-time job increases by 50% for the less educated women (Figure 8.d). It is interesting to note that, as for fathers, hours worked and the probability of working part-time do not change after motherhood for employed mothers with some college education.

Figures 8.e and 8.f show the trajectories of hourly wage and the probability of working in the public sector by education level. None of these outcomes change after the event for both groups of women. However, education does play a role in determining the effects of motherhood on the probability of being employed in the formal sector. The drop in the probability of having a formal job is large (about 35%) and persistent for the less educated group of women, while for the more educated, although negative, the effect on formal employment is not always statistically significant (Figure 8.h). Instead, motherhood does not alter the probability of being employed in the informal sector for any of the two groups, except during a few months around the birth of the first child. As a result of these patterns, we show in Figure 8.i that, conditional on being employed, the probability of working in the informal sector increases after motherhood only for the less educated women.

To sum up, according to our results, motherhood seems to have a larger negative effect on labor outcomes for the less educated women: their probability of exiting the labor force or accepting informal jobs to balance family and work increases after their first child is born. Moreover, since less educated women are less likely to retain formal jobs after becoming mothers, their chances of improving or even maintaining skills are reduced in the long run.

6. Conclusion

Despite substantial improvements over the last century, large gender gaps are still present in domains such as labor supply, earnings and wage rates. Motherhood stands out as one of the key factors driving this gap, given that women still get the lion's share when it comes to childcare. By and large, studies identifying the causal effect of children on mother's labor outcomes have focused on developed countries. Those the results may not be extrapolated to developing countries where female labor force participation rates are lower, labor regulations to balance work and life are weaker, informal sectors are relevant and the provision of public childcare services is insufficient. The evidence of the motherhood effect for such countries is scarce. Some studies have found effects regarding the intensive margin of fertility on women's labor outcomes but to the best of our knowledge no study has yet been able to identify a significant negative effect of becoming a mother, as we do.

In this paper we provide evidence of the effects of motherhood on women's labor outcomes in a developing country, Chile. Following an event-study methodology, we are able to estimate the impact of becoming a mother on several women's labor outcomes in the short and long run. Our results show that becoming a mother implies a drastic and persistent decline in women's earnings: they are reduced by around 20% right after their first child is born and this gap remains fairly stable during the following ten years, although it is important to note that this may combine the effect of subsequent children. This reduction in mother's earnings is explained by changes in labor supply: employment declines by 17%, hours worked fall by 4-5% while part-time jobs increase by 40%. The evidence regarding hourly wages is not conclusive. Furthermore, the evidence shows that the reduction in total earnings is related to an increase in the informality rate after the birth of the first child. Finally, our results show that although the negative impact of motherhood on labor outcomes is present for women regardless their educational attainment, the effects are larger for those less educated.

Thus, our evidence provides support to the hypothesis that motherhood may be driving the large gender gaps in labor outcomes. By and large, results are in line with what has been found for the developed world. It is important to note, however, that the informal sector gains a relevant role in a country such as Chile: it may operate as a buffer, providing the flexibility that parenthood demands. Nevertheless, this comes at a high cost for women: no contributory social protection and the possible depreciation (or lack of accumulation) of some skills that may hinder the path to the formal sector.

Further research could point in several directions. In the first place, it could be interesting to explore to what extent the motherhood effect found is able to explain the gender gap in labor informality in a country such as Chile. Secondly, it would be interesting to disentangle how much of the aggregate gender gap in earnings is explained by motherhood. For a developed country such as Denmark, Kleven *et al.* (2018) show that child penalties currently represent 80% of the total gender gap and that education-related and residual gender inequality have drastically decreased over time. It is not obvious whether these results hold for a developing country such as Chile. Finally, other mechanisms driving the effect of motherhood on women's labor outcomes in developing countries could be assessed. In particular, exploring the division of gender roles within the household would probably shed light on the mechanisms at work.

References

Agüero, J. M., & Marks, M. S. (2011). Motherhood and female labor supply in the developing world evidence from infertility shocks. Journal of Human Resources, 46(4), 800-826.

Altonji, J. G. and R.M. Blank (1999). "Race and gender in the labor market". Handbook of Labor Economics, Volume 3, Part C, Chapter 48, pp. 3143-3259.

Angrist, J. D. and W. N. Evans (1998). "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size." The American Economic Review, 88(3), pp. 450–477.

Berniell, L. and de la Mata, D. (Ed.) (2016). "RED 2016. Más habilidades para el trabajo y la vida: los aportes de la familia, la escuela, el entorno y el mundo laboral." CAF Flagship Report.

Bertrand, M. (2018). "The Glass Ceiling". Becker Friedman Institute, Working Paper 2018-38.

Blau, F., and L. Kahn (2006). "The U.S. Gender Pay Gap in the 1990s: Slowing Convergence". Industrial and Labor Relations Review, 60(1), pp. 45-66.

Blau, F. D., & Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. Journal of Economic Literature, 55(3), 789-865.

Borusyak, K. and X. Jaravel (2017). "Revisiting Event Study Designs, with an Application to the Estimation of the Marginal Propensity to Consume". Working paper, retrieved from https://scholar.harvard.edu/files/borusyak/files/event_studies_may8_website.pdf

Bursztyn, L., T. Fujiwara, and A. Pallais (2017). "'Acting Wife': Marriage Market Incentives and Labor Market Investments". The American Economic Review, 107(11), pp. 3288-3319.

Buser, T., M. Niederle, and H. Oosterbeek (2014). "Gender, competitiveness, and career choices". The Quarterly Journal of Economics, pp. 1409–1447. doi:10.1093/qje/qju009.

Cristia, J. P. (2008). “The Effect of a First Child on Female Labor Supply Evidence from Women Seeking Fertility Services.” J. Human Resources, 43(3), pp. 487-510.

Cruces, G. and S. Galiani (2007). “Fertility and female labor supply in Latin America: New Causal Evidence.” Labour Economics, 14(3), pp. 565-573.

De Jong, E., Smits, J., and A. Longwe (2017). “Estimating the causal effect of fertility on women’s employment in Africa using twins”. World Development, 90,pp. 360-368.

Deaton, A. (1997). *The Analysis of Household Surveys. A Microeconometric Approach to Development Policy*. The World Bank, The Johns Hopkins University Press, Baltimore and London.

Dix-Carneiro, R. and B. K. Kovak (2017). “Margins of labor market adjustment to trade”. Technical report, National Bureau of Economic Research.

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G. Wagner (2011). “Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences”. Journal of the European Economic Association, 9, pp. 522-550. doi:10.1111/j.1542-4774.2011.01015.x

Goldin, C. (2014). “A Grand Gender Convergence: Its Last Chapter”. American Economic Review, 104(4), pp. 1091-1119.

Kleven, H., C. Landais, and J.E. Sogaard (2018). “Children and Gender Inequality: evidence from Denmark”. Working Paper, Revised July 2018, Revise & Resubmit American Economic Journal: Applied Economics.

Kuziemko, I., J. Pan, J. Shen, and E.Washington (2018). “The Mommy Effect: Do Women Anticipate the Employment Effects of Motherhood?”. NBER Working Paper No. 24740.

Lundborg, P., E. Plug, and A. Würtz Rasmussen (2017). "Can Women Have Children and a Career? IV Evidence from IVF Treatments." American Economic Review, 107 (6), pp. 1611-37.

Niederle, M. and L. Vesterlund (2007). "Do Women Shy Away from Competition? Do Men Compete Too Much?," The Quarterly Journal of Economics, MIT Press, 122(3), pp. 1067-1101.

OECD (2012). OECD Online Employment database. Accessed August 20th, 2018. http://www.oecd.org/employment/emp/onlineoecdemploymentdatabase.htm

Orbeta, A. (2005). “Children and the labor force participation and earnings of parents in the Philippines”. Philippine Journal of Development, 32(1), pp. 19–52.

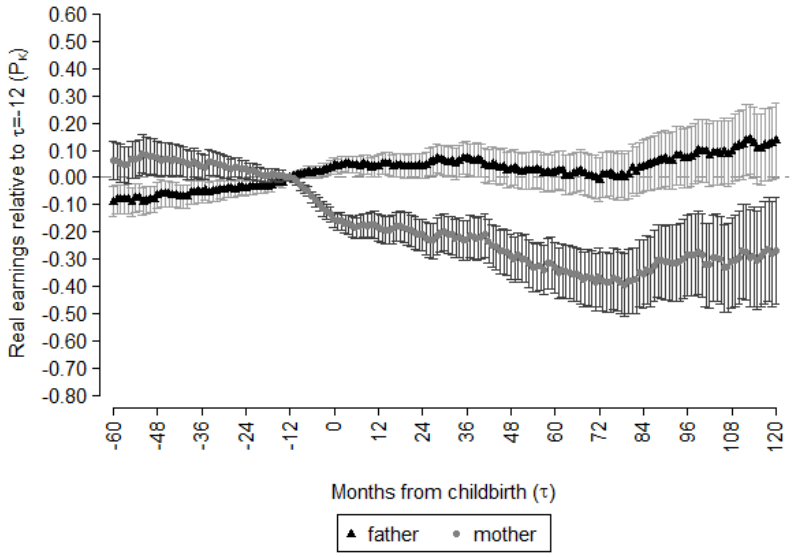
Ponczek, V. and G. Ulyssea (2018). “Is informality an employment buffer? Evidence from the trade liberalization in brazil”. Unpublished manuscript.

Rosenzweig, M. and K. Wolpin (1980). “Testing the Quantity-Quality Fertility Model: The Use of Twins as a Natural Experiment”. Econometrica, 48(1), pp. 227-240. doi:10.2307/1912026

SEDLAC, CEDLAS and The World Bank. Accessed August 20th, 2018. http://www.cedlas.econo.unlp.edu.ar/wp/estadisticas/sedlac/

Tortarolo, D. (2014). “Female Labor Supply and Fertility. Causal Evidence for Latin America.” CEDLAS Working Paper 166.

Figure 1: Impacts on Earnings



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: The figure shows, for men and women, the estimated coefficients P_τs that measure the impact of children on earnings as a percentage of a counterfactual value of the outcome without children ($P_\tau = \hat{\beta}_\tau / \tilde{Y}$, where $\hat{\beta}_\tau$ s are estimated from equation (1) and $\tilde{Y}$ is the estimated counterfactual, as it is explained in Section 3). The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The effects on earnings is estimated unconditional on employment status. The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 2: Impacts on labor supply

Figure 2.a: Labor force participation

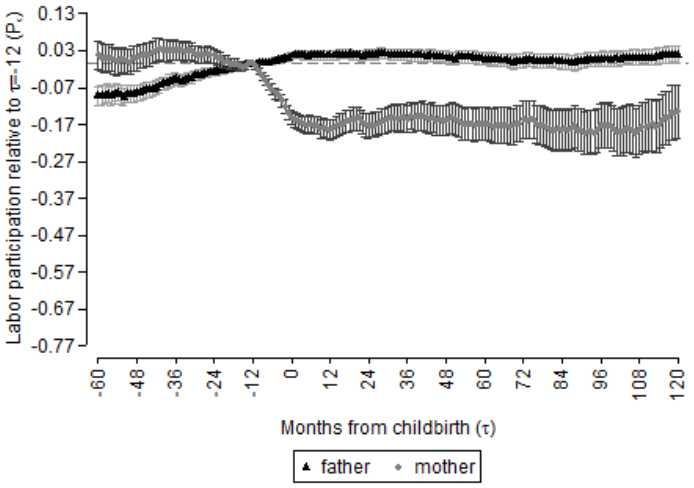


Figure 2.b: Employment

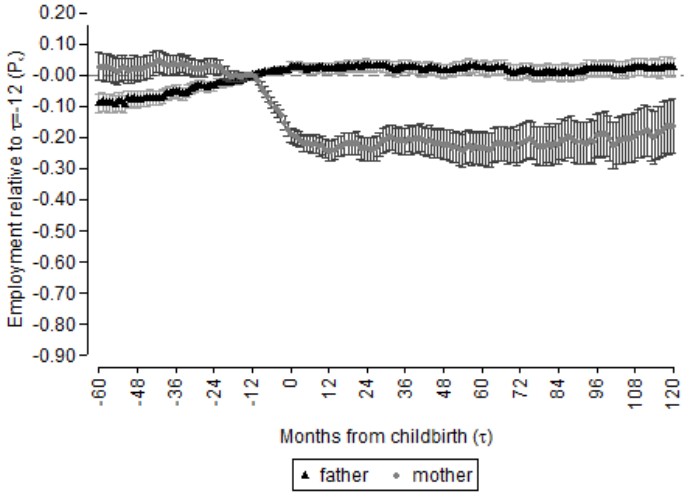


Figure 2.c: Hours

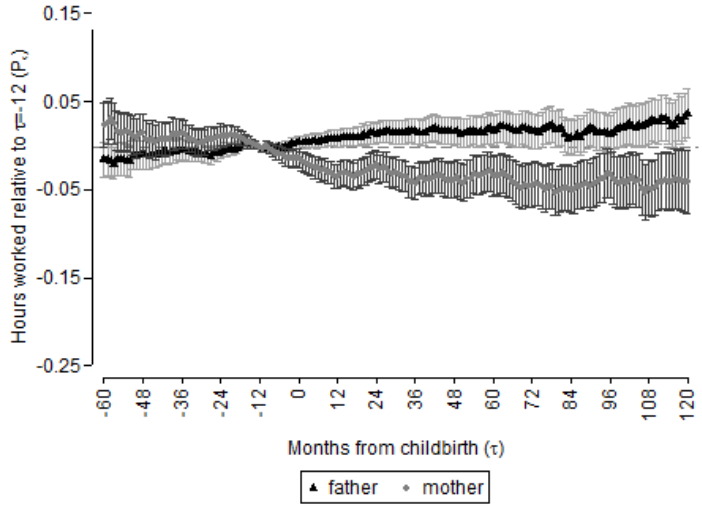
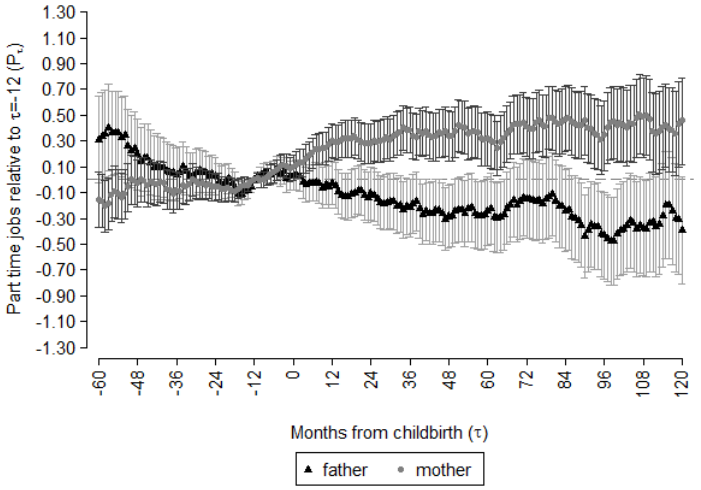


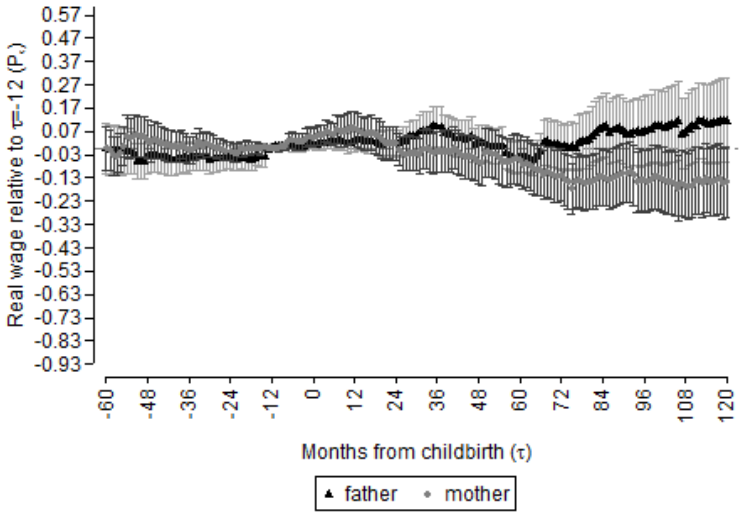
Figure 2.d: Part-time



Source: Own calculations based on the Social Protection Survey (SPS).

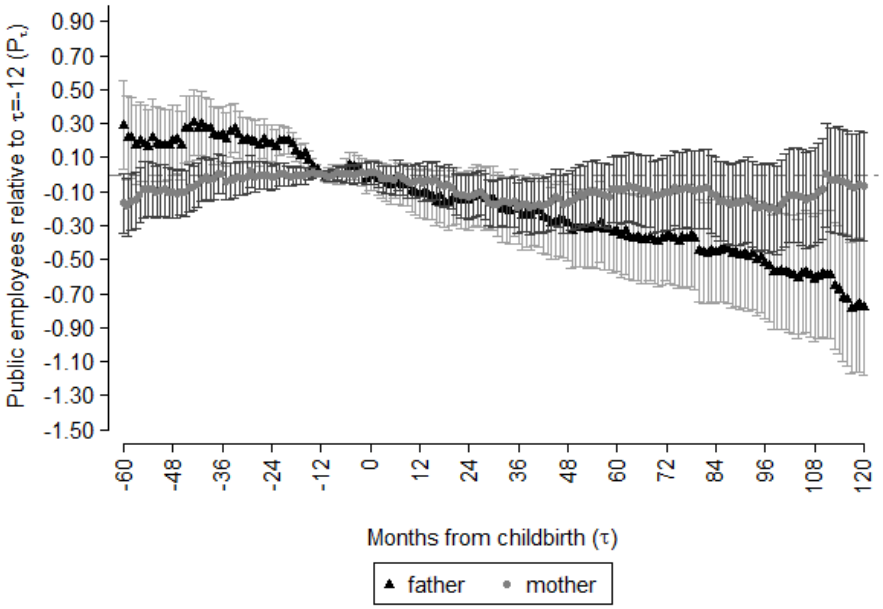
Notes: As in Figure 1, figures show, for men and women, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ from equation 1) on labor force participation (Figure 2.a), employment (Figure 2.b), hours worked (Figure 2.c) and on the probability of working part-time. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The effects on hours and probability of working part-time is estimated conditional on working. The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 3: Impacts on hourly wage



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: As in Figure 1, this figure shows, for men and women, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ from equation 1) on hourly wage, conditional on working. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 4: Impacts on occupational choices (conditional on working): Public sector employment



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: As in Figure 1, this figure shows, for men and women, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ from equation 1) on the probability of working in the public sector, conditional on working. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 5: Impacts on occupational choice: formal and informal employment (unconditional on working)

Figure 5.a: Mothers

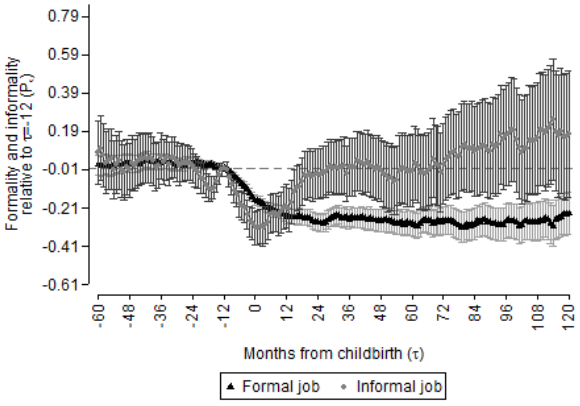


Figure 5.b: Fathers

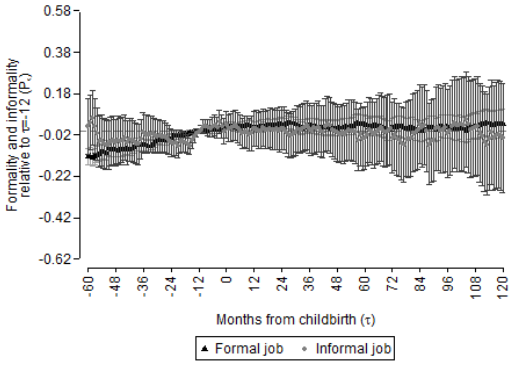


Figure 6: Impacts on occupational choice: informal employment (conditional on working)

Figure 6.a: Mothers

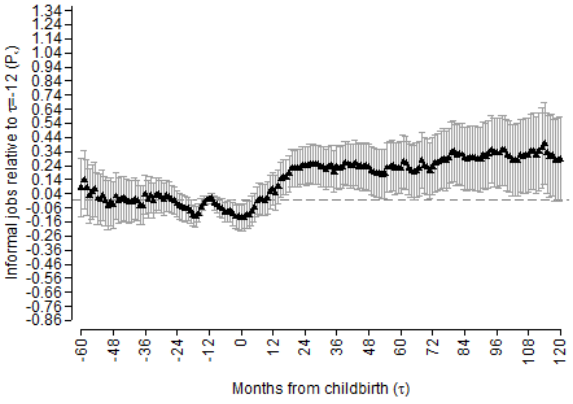
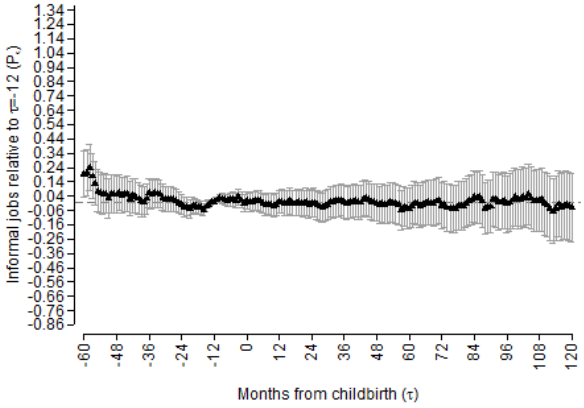
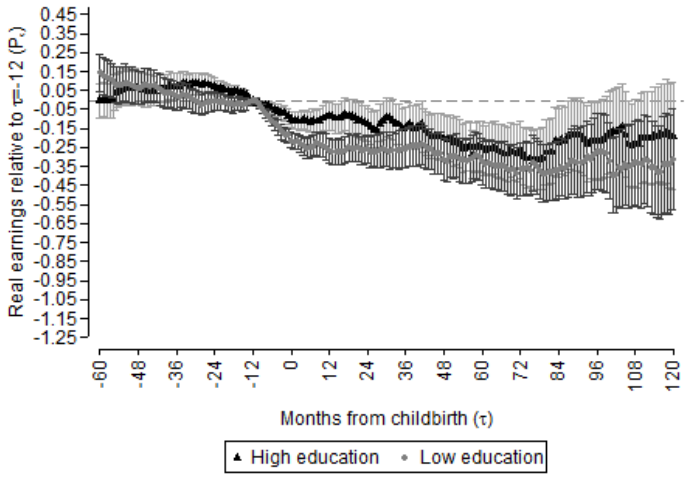


Figure 6.b: Fathers



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: These figures show, for women and men, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \bar{Y}$ from equation 1) on the probability of working in the formal (Figures 5.a and 5.b) or the informal labor market (Figures 6.a and 6.b). The estimations are unconditional on employment status. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 7. Impacts by education: earnings



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: This figure shows, for less and more educated women separately, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ from equation 1) on earnings. The estimations are unconditional on employment status. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old and observed at least once before childbirth and at least once after (unbalanced panel). The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Figure 8. Impacts by education

Figure 8.a: Labor force participation

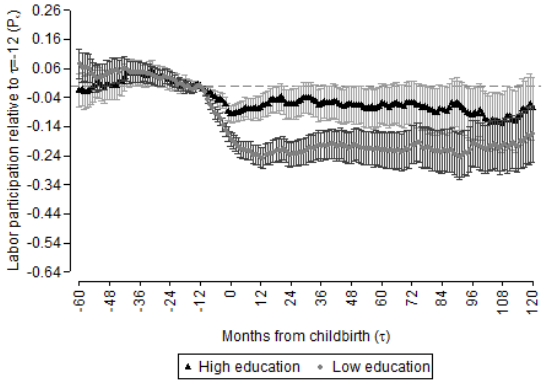


Figure 8.b: Employment

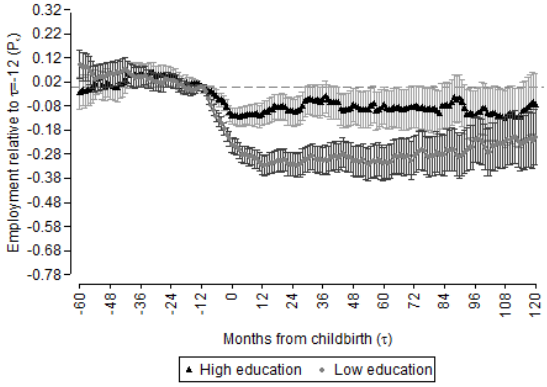


Figure 8.c: Hours

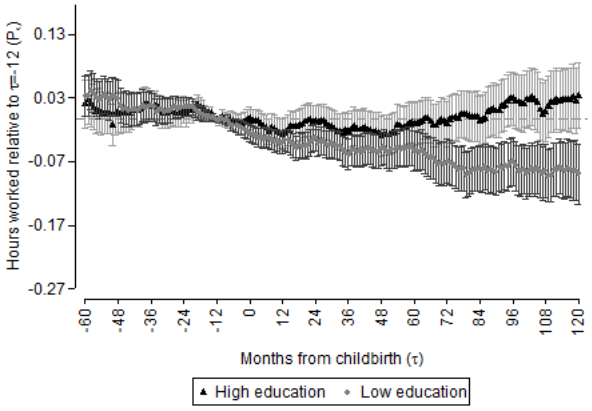


Figure 8.d: Part-Time

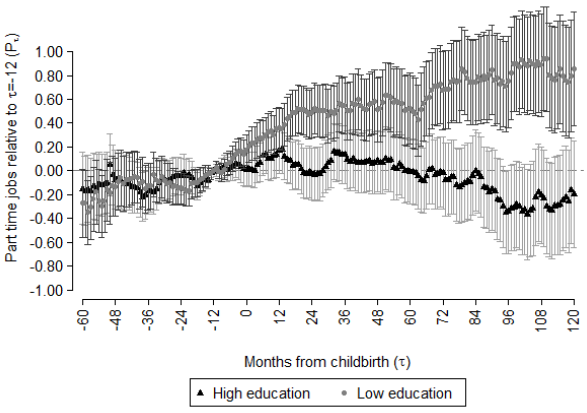


Figure 8.e: Hourly wage

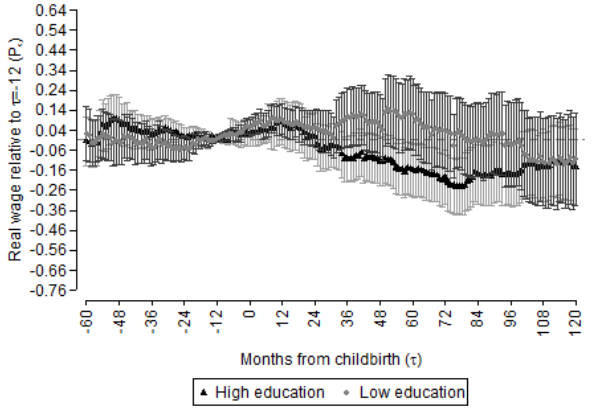


Figure 8.f: Public Sector

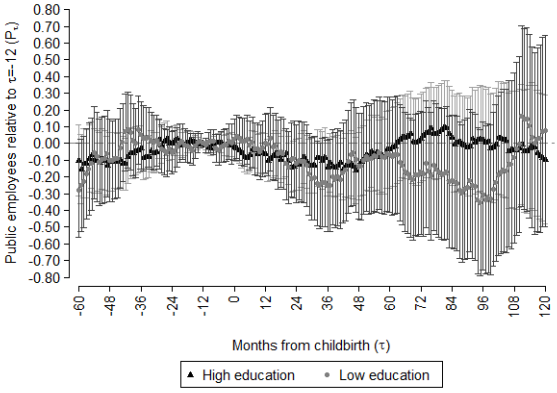


Figure 8.g: Informality (unconditional on working)

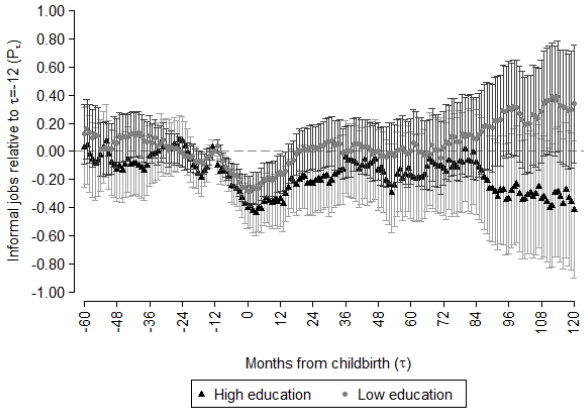


Figure 8.h: Formality (unconditional on working)

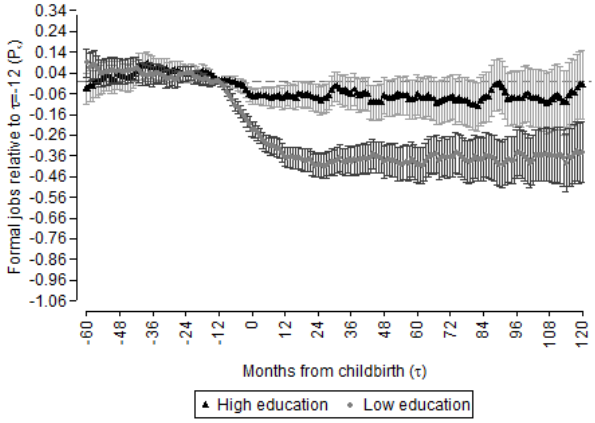
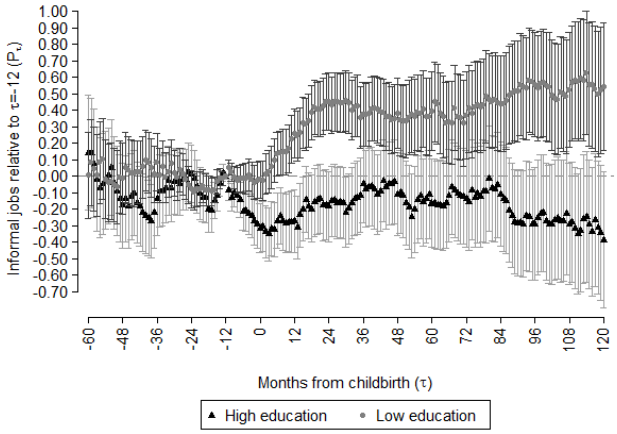


Figure 8.i: Informality (conditional on working)



Source: Own calculations based on the Social Protection Survey (SPS).
Notes: The figures show, for less and more educated women separately, the estimated impact of children (coefficients $P_\tau = \hat{\beta}_\tau / \tilde{Y}$ from equation 1) on different labor market outcomes. All estimations are conditional on working except those shown in Figures 8.g and Figure 8.h. The omitted category is $\tau = -12$, i.e the coefficients measure the impact of children relative to the year before the birth of the first child. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old and observed at least once before childbirth and at least once after (unbalanced panel). The 90% confidence intervals are constructed based on standard errors clustered at individual level.

Appendix A

Labor outcomes in the SPS are obtained by means of recall questions that cover past labor market episodes (including periods of working, unemployment, leave of absence, and inactivity). The precise definitions for the outcome variables that we analyze are:

- **Total earnings**: net monthly salary, or monthly earnings in the case of self-employed. Total earnings equals zero for unemployed or inactive individuals.
- **Labor force participation**: takes the value one if individual declares to have been working (including leave of absence), or actively looking for a job during the corresponding month, and it takes the value zero otherwise.
- **Employment**: takes the value one if individual declares to have been working (or on leave of absence) during the corresponding month, and it takes the value zero for unemployed or inactive individuals.
- **Hours worked**: number of weekly hours that the individual declares to have been regularly working in the corresponding month. This variable is only defined for employed individuals (missing for unemployed and inactive).
- **Part-time employment**: takes the value one if individual declares to have been working less than 30 hours a week during the corresponding month, and it takes the value zero for those employed individuals that work 30 or more hours a week.
- **Hourly wages**: ratio (monthly) total earnings to (monthly) hours worked.
- **Employment in the public sector**: takes the value one if individual declares to have been working (or on leave of absence) in the public sector during the corresponding month, and it takes the value zero if the individual declares to have been working in the private sector.
- **Employment in the formal sector, unconditional on working**: takes the value one if individual declares to have been working (or on leave of absence) and contributing to social security during the corresponding month, and zero otherwise.
- **Employment in the formal sector, conditional on working**: takes the value one if individual declares to have been working (or on leave of absence) and contributing to social security during the corresponding month, and zero if the individual declares to have been working but not contributing to social security.
- **Employment in the informal sector, unconditional on working**: takes the value one if individual declares to have been working (or on leave of absence) and not contributing to social security during the corresponding month, and zero otherwise.

- **Employment in the informal sector, conditional on working**: defined as one minus the value of the variable “Employment in the formal sector, conditional on working”.

Appendix B. Tables

Table 1. Impacts on labor supply and earnings

	(1)	(2)	(3)	(4)	(5)	(6)
	Labor participation		Employment		Real earnings (in CLP)	
	Mother	Father	Mother	Father	Mother	Father
-5 years	0.015	-0.078***	0.014	-0.077***	10,213.682	-28,528.666***
	(0.015)	(0.014)	(0.015)	(0.015)	(6,888.166)	(10,582.165)
-4 years	0.009	-0.070***	0.010	-0.066***	11,427.146*	-20,698.211**
	(0.013)	(0.012)	(0.013)	(0.013)	(6,290.644)	(9,425.008)
-3 years	0.023**	-0.036***	0.018*	-0.044***	6,405.187	-17,029.348**
	(0.010)	(0.009)	(0.011)	(0.010)	(4,828.135)	(7,875.037)
-2 years	0.013*	-0.021***	0.015*	-0.031***	5,139.976	-12,164.184**
	(0.007)	(0.006)	(0.008)	(0.008)	(3,240.611)	(5,268.238)
0 years	-0.092***	0.019***	-0.106***	0.022***	-25,185.607***	14,715.792***
	(0.007)	(0.005)	(0.008)	(0.007)	(2,860.083)	(5,020.265)
1 years	-0.112***	0.020***	-0.134***	0.016*	-29,807.649***	13,455.687*
	(0.010)	(0.007)	(0.010)	(0.009)	(4,899.655)	(7,383.809)
2 years	-0.106***	0.022***	-0.130***	0.026***	-34,064.363***	13,554.776
	(0.012)	(0.007)	(0.012)	(0.010)	(5,859.802)	(9,179.914)
3 years	-0.095***	0.022***	-0.118***	0.022**	-37,398.519***	23,063.107**
	(0.014)	(0.008)	(0.014)	(0.010)	(7,385.066)	(11,305.985)
4 years	-0.097***	0.015*	-0.122***	0.010	-47,432.426***	10,071.603
	(0.016)	(0.009)	(0.016)	(0.011)	(8,188.751)	(12,896.967)
5 years	-0.102***	0.011	-0.130***	0.019	-53,933.824***	6,821.452
	(0.017)	(0.009)	(0.018)	(0.011)	(9,192.038)	(13,587.825)
6 years	-0.096***	0.006	-0.121***	0.008	-59,463.688***	-2,118.194
	(0.019)	(0.010)	(0.020)	(0.012)	(10,478.809)	(15,424.472)
7 years	-0.114***	0.004	-0.122***	0.006	-57,343.930***	13,458.794
	(0.021)	(0.010)	(0.021)	(0.013)	(12,221.540)	(18,238.033)
8 years	-0.106***	0.011	-0.109***	0.016	-46,598.810***	23,229.933
	(0.023)	(0.011)	(0.024)	(0.013)	(14,534.032)	(21,207.462)
9 years	-0.113***	0.014	-0.109***	0.022	-50,671.948***	31,067.723
	(0.026)	(0.011)	(0.026)	(0.014)	(16,268.411)	(23,721.836)
10 years	-0.082***	0.021*	-0.089***	0.019	-43,786.849**	43,288.872
	(0.028)	(0.012)	(0.029)	(0.016)	(19,316.841)	(26,419.038)
Observations	342,370	289,869	342,370	289,869	335,342	279,533
Mean of counterfactual ($\bar{Y}$)	0.63	0.88	0.55	0.83	161,722	318,138

Source: Own calculations based on the Social Protection Survey (SPS).

Notes: The table shows, for men and women, the estimated coefficients $\hat{\beta}_\tau$s from equation 1. For $\tau \geq 0$ these coefficients measure the impact of parenthood on the specific outcome at period τ after the birth of the first child (see Section 3). The omitted category is $\tau = -12$ months (-1 year), i.e the coefficients measure the impact of children relative to the year before the birth of the first child. The table only reports $\hat{\beta}_\tau$s for τ=-60, -48, 36…, 0, 12, …, 108, 120), i.e. exactly 5 years before childbirth, 4 years before, etc., up to exactly 10 years after the childbirth. Estimations of all the coefficients are available upon request. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The effects are estimated unconditional on employment status. Standard errors clustered at individual level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2. Impacts on hours worked and hourly wage

	(1)	(2)	(3)	(4)	(5)	(6)
	Hours worked		Part time jobs		Real wage (in CLP)	
	Mother	Father	Mother	Father	Mother	Father
-5 years	1.069*	-0.655	-0.023	0.018	-0.025	-3.666
	(0.632)	(0.542)	(0.019)	(0.012)	(109.353)	(142.502)
-4 years	0.728	-0.395	-0.004	0.011	77.815	-66.117
	(0.543)	(0.456)	(0.016)	(0.010)	(99.276)	(99.339)
-3 years	0.678	-0.154	-0.013	0.002	-16.594	-92.523
	(0.433)	(0.354)	(0.013)	(0.007)	(70.522)	(85.004)
-2 years	0.580*	-0.249	-0.009	0.001	-24.774	-79.315
	(0.321)	(0.227)	(0.009)	(0.005)	(46.981)	(71.433)
0 years	-0.541**	0.266	0.014	0.002	91.799*	52.472
	(0.270)	(0.191)	(0.009)	(0.004)	(48.693)	(36.216)
1 years	-1.414***	0.458*	0.044***	-0.002	177.575**	67.726
	(0.358)	(0.272)	(0.012)	(0.006)	(84.398)	(59.233)
2 years	-0.837*	0.703**	0.041***	-0.006	40.627	48.864
	(0.428)	(0.340)	(0.014)	(0.007)	(86.278)	(76.356)
3 years	-1.744***	0.879**	0.056***	-0.012	-29.141	201.291*
	(0.468)	(0.403)	(0.015)	(0.008)	(105.226)	(112.392)
4 years	-1.568***	0.833*	0.049***	-0.016*	-106.075	53.965
	(0.523)	(0.440)	(0.017)	(0.009)	(114.246)	(98.687)
5 years	-1.373**	0.904*	0.046**	-0.014	-96.126	-73.629
	(0.581)	(0.491)	(0.018)	(0.009)	(128.809)	(88.851)
6 years	-1.809***	0.854	0.060***	-0.009	-222.318	1.864
	(0.641)	(0.542)	(0.020)	(0.010)	(135.250)	(129.469)
7 years	-2.019***	0.564	0.068***	-0.014	-242.979*	195.391
	(0.677)	(0.563)	(0.022)	(0.011)	(143.784)	(179.181)
8 years	-1.238*	0.707	0.050**	-0.025**	-273.512*	163.374
	(0.733)	(0.613)	(0.024)	(0.012)	(158.035)	(196.028)
9 years	-1.955**	1.308*	0.070***	-0.021	-307.343*	146.345
	(0.813)	(0.681)	(0.027)	(0.013)	(168.094)	(201.461)
10 years	-1.670*	1.813**	0.066**	-0.022	-279.240	263.180
	(0.904)	(0.784)	(0.030)	(0.015)	(181.438)	(241.089)
Observations	159,576	235,753	159,576	235,753	153,285	226,844
Mean of counterfactual ($\tilde{Y}$)	42.32	46.74	0.15	0.06	1,958	2,178

Source: Own calculations based on the Social Protection Survey (SPS).

Notes: The table shows, for men and women, the estimated coefficients $\hat{\beta}_\tau$s from equation 1. For $\tau \geq 0$ these coefficients measure the impact of parenthood on the specific outcome at period τ after the birth of the first child (see Section 3). The omitted category is $\tau = -12$ months (-1 year), i.e the coefficients measure the impact of children relative to the year before the birth of the first child. The table only reports $\hat{\beta}_\tau$s for τ=-60, -48, 36…, 0, 12, …, 108, 120), i.e. exactly 5 years before childbirth, 4 years before, etc., up to exactly 10 years after the childbirth. Estimations of all the coefficients are available upon request. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). The effects are estimated conditional on working. Standard errors clustered at individual level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Impacts on occupational choice

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Informal jobs		Formal jobs (unconditional on employment status)		Informal jobs (unconditional on employment status)		Public employees	
	Mother	Father	Mother	Father	Mother	Father	Mother	Father
-5 years	0.014	0.037*	0.008	-0.082***	0.008	0.004	-0.027	0.020*
	(0.022)	(0.019)	(0.014)	(0.017)	(0.010)	(0.013)	(0.017)	(0.011)
-4 years	-0.007	0.009	0.011	-0.059***	-0.001	-0.009	-0.018	0.013
	(0.017)	(0.015)	(0.012)	(0.014)	(0.008)	(0.011)	(0.014)	(0.008)
-3 years	0.006	0.011	0.013	-0.044***	0.006	-0.000	0.000	0.016**
	(0.014)	(0.012)	(0.010)	(0.012)	(0.007)	(0.009)	(0.011)	(0.007)
-2 years	-0.006	-0.004	0.014*	-0.022**	0.001	-0.009	-0.003	0.012***
	(0.010)	(0.008)	(0.007)	(0.009)	(0.005)	(0.006)	(0.007)	(0.004)
0 years	-0.022**	0.002	-0.076***	0.018**	-0.030***	0.005	0.001	-0.000
	(0.010)	(0.007)	(0.007)	(0.008)	(0.005)	(0.006)	(0.007)	(0.004)
1 years	0.013	0.000	-0.115***	0.014	-0.019***	0.002	-0.005	-0.008
	(0.013)	(0.009)	(0.010)	(0.010)	(0.006)	(0.008)	(0.010)	(0.006)
2 years	0.042***	-0.002	-0.127***	0.025**	-0.003	0.002	-0.022*	-0.010
	(0.014)	(0.011)	(0.012)	(0.012)	(0.008)	(0.010)	(0.013)	(0.007)
3 years	0.040**	0.000	-0.120***	0.020	0.000	0.003	-0.032**	-0.014*
	(0.016)	(0.013)	(0.014)	(0.014)	(0.009)	(0.011)	(0.015)	(0.008)
4 years	0.039**	-0.002	-0.123***	0.011	-0.001	-0.001	-0.027	-0.019**
	(0.017)	(0.015)	(0.016)	(0.016)	(0.010)	(0.013)	(0.017)	(0.009)
5 years	0.039**	-0.008	-0.130***	0.024	-0.001	-0.005	-0.014	-0.022**
	(0.019)	(0.017)	(0.018)	(0.017)	(0.011)	(0.015)	(0.019)	(0.010)
6 years	0.040*	-0.006	-0.124***	0.013	0.002	-0.005	-0.017	-0.024**
	(0.021)	(0.019)	(0.020)	(0.019)	(0.012)	(0.017)	(0.021)	(0.011)
7 years	0.051**	0.007	-0.132***	0.001	0.008	0.006	-0.021	-0.030**
	(0.023)	(0.021)	(0.022)	(0.021)	(0.014)	(0.019)	(0.023)	(0.012)
8 years	0.058**	-0.003	-0.126***	0.017	0.016	-0.001	-0.030	-0.035**
	(0.026)	(0.023)	(0.024)	(0.023)	(0.015)	(0.021)	(0.025)	(0.013)
9 years	0.055*	0.001	-0.126***	0.019	0.015	0.003	-0.021	-0.041***
	(0.028)	(0.025)	(0.027)	(0.025)	(0.017)	(0.023)	(0.029)	(0.015)
10 years	0.049	-0.007	-0.107***	0.024	0.017	-0.005	-0.012	-0.052***
	(0.031)	(0.028)	(0.030)	(0.028)	(0.019)	(0.025)	(0.032)	(0.016)
Observations	160,821	240,109	341,159	288,453	341,159	288,453	162,032	241,525
Mean of counterfactual ($\tilde{Y}$)	0.17	0.19	0.45	0.67	0.10	0.16	0.16	0.07

Source: Own calculations based on the Social Protection Survey (SPS).

Notes: The table shows, for men and women, the estimated coefficients $\hat{\beta}_\tau$s from equation 1. For $\tau \geq 0$ these coefficients measure the impact of parenthood on the specific outcome at period τ after the birth of the first child (see Section 3). The omitted category is $\tau = -12$ months (-1 year), i.e the coefficients measure the impact of children relative to the year before the birth of the first child. The table only reports $\hat{\beta}_\tau$s for τ=-60, -48, 36…, 0, 12, …, 108, 120), i.e. exactly 5 years before childbirth, 4 years before, etc., up to exactly 10 years after the childbirth. Estimations of all the coefficients are available upon request. Controls include year, month and age fixed effects. Data covers the period 2002-2016 and the sample includes those parents whose first child was born during that period. The sample is restricted to mothers whose age at first childbirth is between 18 and 50 years old, fathers whose age at first childbirth is between 18 and 60 years old, and individuals observed at least once before childbirth and at least once after (unbalanced panel). In columns 3 to 6 the effects are estimated unconditional on employment status. Standard errors clustered at individual level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.