The Labor Market Consequences of Maternity Leave Policies: Evidence from Brazil

Cecilia Machado[*] and V. Pinho Neto[†]

This Version: December 2016

Abstract

This paper examines the labor market consequences of paid maternity leave for women who participate in the Brazilian formal labor market (and thus qualify for the leave policy). We take advantage of rich administrative data and follow women 47 months before and after leave-taking. Using an event study approach, we find an inverted U-shape employment pattern, which peaks at the first month of leave-taking. Employment is stable until the fourth month, indicating compliance with the legislation, but drops sharply after the job protection period and stabilizes again at around one year. Almost half of the women are out of the formal labor market 47 months after the leave. As most employment effects are due to separations that occur from employer's initiative, our results suggest that further policies are needed to promote higher attachment of women in the labor market, especially for the less educated workers. We also restrict our analysis to firms that have extended the leave period by combining the event study analysis with a difference-in-difference strategy. We find that the extended leave policy alleviates part of the negative employment effects of maternity leave-taking.

Keywords: paid maternity leave, maternal employment, gender equality.
JEL Classification: J13, J18, H42

---

[*]Corresponding author. Getulio Vargas Foundation (EPGE-FGV) and IZA. E-mail: machadoc@gmail.com

[†]Getulio Vargas Foundation (EPGE-FGV). E-mail: valdemar.pinhoneto@gmail.com

1 Introduction

Maternity leave policies are designed to help mothers cope with their work and family responsibilities in the presence of a newborn. Proponents of such policies advocate that time spent at home with newborns can enhance child development, as well as promote gender equality in both household and workplace. The efficacy of maternity leave policy depends on its specific rules (paid vs. unpaid leave, length of leave, eligibility requirements, etc.), the cultural norms on gender roles, the development of the local labor market and the specific child care arrangements available in each country.

In the last century, the participation of women in the labor market has increased substantially. Therefore, many countries had to adapt their labor legislation to accommodate pregnant women and mothers of young children. Traditionally, women carry the greatest share of responsibility towards their children and this is especially so of newborns. Thus, legislation on maternity leave can acutely affect the situation of women in the labor market. While there exists extensive evidence of maternity leave policies using credible research designs, those mostly exist for developed countries. Developing countries, in contrast, exhibit higher levels of poverty and lower levels of health care provision, aside from different arrangements in child care and support. In this paper we study maternity leave policies and the labor market trajectory of women in Brazil.

According to the data from the National Household Sample Survey (PNAD), in 2012 Brazil had almost 55 million of women in fertile age (i.e, 15-49 years old), of which approximately 57% had worked during the reference week of the survey. Around 38% of these women were formally/legally employed in the private sector, representing more than 11 million women. It is worth mentioning that according to the Brazilian rules all these women (but not only them) are eligible to receive maternity leave paid. If we additionally restrict the analysis for those women who were between 25 and 35 years old (5 million women), which will be our universe of interest, we find that approximately 4% of them had children in the last 12 months prior to the reference week of the survey and hence had been benefited for the policy.

In Brazil, maternity leave policy entitles eligible workers 100% income replacement for 120 days after birth date[1]. Using administrative data on the formal workers in

---

[1] Maternity leave can start before child birth depending on medical conditions, but still sums 120

the country, we are able to identify the maternity leave taken by eligible women[2], and investigate the short and long run effects of maternity leave on employment, separations and hirings. We restrict the data for women who took maternity leave only once in a given year and were between 25 and 35 years old, excluding public sector employees.

Our empirical strategy is an event study analysis, that explores the labor market trajectories of employed women, before and after leave-taking, controlling for month-year fixed effects, demographic characteristics and firm characteristics. We examine the work trajectories of a large number of women for 47 months prior and up to 47 months after leave-taking. Our identifying assumption is that, conditional on taking the maternity leave, the timing in which the maternity leave was taken is uncorrelated with the outcome. We also control for individual fixed effects in our robustness analysis. Based on administrative data (Relação Anual de Informações Sociais-RAIS) on Brazilian women formally employed and who took maternity leave in 2009 and 2012, we create an unique monthly panel able to follow these women for a long time, before and after leave-taking. Women are divided in two groups according to the year when they took maternity leave. In the first panel we follow those women who took maternity leave during 2009 (122,174 women) and secondly we analyze 125,281 women who took maternity leave in 2012.

This division is useful to measure the effect of the extension in the period (from 120 to 180 days) of maternity leave using a difference-in-difference approach. While extending leave-taking is not mandatory[3], we investigate the changes in adoption of expanded maternity leave made by one group of companies. More specifically, we study firms that offered maternity leave for 180 days in 2012. In order to make the group of control, we identify the same group of firms in 2009 and restrict our analysis to those companies present in both years and that offered 120 days in 2009. We pool the restricted panels and follow the employment pattern for these sub-population of women for 47 months before and after the leave-taking, considering the difference between who

days from start to finish.

[2]Eligible women are those who participate in the formal labor market and consequently pay for social security, since this is the only requirement for being entitled to paid maternity leave.

[3]There is one tax benefit that came into effect after 2010 and intended to encourage firms to offer paid maternity benefits up to 180 days after childbirth, named *Empresa Cidadã Program*. Currently, this is the main program which aims to extend the rest period for mothers in Brazil. However, companies can offer extensions on leave-taking even without participating in any specific program.

took 180 days in 2012 (*Treatment Group*) and 120 days in 2009 (*Control Group*).

Preliminary results show an inverted U-shaped employment pattern which peaks at the time of leave-taking[4]. Employment is stable until the forth months after the beginning of the leave period, but falls monotonically thereafter and stabilizes again after around 12 months. The pattern observed in separation and hiring corroborates our findings on employment. Moreover, we verify that some companies have been effective in extending the rest period for two months over the previously established norm. For instance, our difference-in-difference strategy shows that those women who extended maternity leave period had more job protection, being 7.5 percentage point more likely of being employed six months after leave-taking starts. However, our findings indicate that the maternity leave policy in Brazil is not sufficient to retain women in the workforce in the long term and further policies are needed in that respect.

The remainder of the paper is divided as follows. The next section provides background on maternity leave policies in Brazil. Section 3 discusses related literature. In section 4 and 5 we present our data and empirical strategy, respectively. Section 6 shows the results and section 7 concludes.

2   Maternity Leave Policies in Brazil

In Brazil, maternity leave is assured by article 7, item XVIII of the Brazilian Constitution, since 1988. The law guarantees women who have a baby one period of paid maternity leave for 120 days, without any type of loss regarding to employment, job position or salary. Legally, every woman who is formally employed is entitled to receive this benefit.[5] The Federal Constitution also guarantees that from the moment in which the pregnancy is confirmed up to five months after giving birth, the company must not terminate the employee, protecting her from arbitrary dismissal. In case of employment

---

[4]Since our analysis conditions on leave-taking, and leave taking eligibility depends on employment, the employment peak at the first month of leave taking is expected.

[5]In general, not only pregnant women have this right, but also those who adopt or obtain judicial custody for adoption purposes, regardless of the child's age. Women who have been spontaneous abortions or those provided by law (rape, anencephalic fetus and risk to the pregnant woman's life) are also entitled to benefit. In these cases, the period of maternity leave is only 14 days. In case of a stillborn baby, after the 23rd week of gestation (before that it is considered an abortion), maternity leave period as well as the benefit amount are completely guaranteed.

separation occurring during maternity leave period, the employer has to pay an indemnity according to the salary commonly received and the period in which the law had not been observed.[6]

During the period of maternity leave, the workers must receive their salary normally, paid by the employer but reduced from the usual payments amount due to Social Security contributions. The employee can take maternity leave since the last month of gestation (28 days before the birth) or since the date of birth. If there is a medical recommendation for a woman to be absent for more than 28 days before the expected birth day, she must present a medical certificate proving this. The employer must be formally notified by either medical or birth certificate. The total leave time is normally 120 days, regardless of when it starts. Finally, the rest periods before and after delivery, can be increased by 2 (two) weeks, if necessary and by means of medical certificate.

Some companies usually offer extensions in the period of maternity leave for more 60 days. Often this is motivated by companies that want to send a positive signal to the market, in terms of benefits of working in that company or about their sense of social responsibility. In other cases, unions also negotiate with the companies about the extension of the period of maternity leave in the sector they represent. In both cases, the main argument to support the extension is the understanding that the mother's presence during the first months of life is fundamental for both the child's development and the strengthening of the affective bond between mother and child. Although some companies and sectors already have decided to offer extended maternity leaves previously, only after 2008 the Brazilian federal government began its incentive policy at the national ambit, through the *Empresa Cidadã Program*.

On September 9th, 2008, the Law 11,770 was enacted, which established the *Empresa Cidadã Program*, designed to extend maternity leave by means of a tax incentive. Based on this program, the maternity leave period can be extended for 60 (sixty) days (i.e., 180 days' leave in total) for those companies who are taxed based on actual profit.[7]

---

[6]When a woman realizes a pregnancy she immediately acquires job stability, even if she has not yet communicated it to the employer. Furthermore, the period of stability is a right even in a temporary employment contract or if woman becomes pregnant during the period of work experience. The woman can break the commitment resulting from any employment contract, whether she considers that it is harmful to the gestation, testified by medical certificate.

[7]Despite the rule only applying to companies that are taxed on actual profits, companies that declare presumed profit or that participate in the Simples Nacional Program can also join the program, but

The participation in this program is voluntary and the company can deduct as an operating expense the full amount paid during the extension (in general, two extra salaries for 2 months) in the income tax of the company. Therefore, the firm does not have financial costs, except for having an employee out of the position during the period. Since the program started there is greater participation amongst public companies than private companies.[8] The extension of the period of maternity leave for 60 days in the private companies only came into force after January 1st, 2010, with the regulation by Decree No. 7,052 of December 23, 2009.

Finally, although the companies decide to extend or not the maternity leave provision, the decision to accept or not an extension depends entirely on the employee's choice. In addition, the right to two months extension has to be guaranteed to every employee who works for a *Empresa Cidadã*.[9]

3 Related Literature

The past few decades have experienced a significant increase in the number of countries offering maternity leave policies. This is mainly a result of a worldwide trend in which women's participation in the labor market has increased substantially over time. The literature shows that the policy elements surrounding job protection, leave payment and total duration of paid leave differs substantially across nations. Furthermore, even in case of programs with similar characteristics, their effects may vary depending on the economic environment as well as local cultural factors. Consequently, given the diversity of characteristics and contexts in which these policies have been implemented, the number of studies and researchers interested in this topic has gained salience.

Dahl et al. [2013] assess paid maternity leave after a series of policy reforms in Norway, which expanded paid leave from 18 to 35 weeks without changing the length

---

they will not be entitled to any deduction.

[8]Although Law No. 11,770 was enacted in September 2008, only became effective after 2010. This happened basically because the Brazilian Fiscal Responsibility Law requires that all impacts from any tax exemption must be included in the Budget Law one year before. However, there was no enough time to include them in 2008.

[9]If the employee want to use this extension, she must apply up to 30 days after the giving birth and it starts immediately after the regular maternity leave ends. During the extension, employees must continue to receive their full benefits, but they must participate in any paid activity and the child cannot be kept in a daycare or similar organization, otherwise the extension will be forfeited.

of job protection. The authors use a RDD strategy and find that the reforms caused an increase in mother's time spent at home after birth, without reduction in family income. However, they suggest that the generous extensions to paid leave are costly, without effect on a set of relevant outcomes (such as: children's school outcomes, parental earnings and participation in the labor market, completed fertility, marriage or divorce) and have regressive redistribution properties.

Bartel et al. [2015] use a difference-in-difference approach to evaluate the first case of leave available to fathers in the U.S, the Californian Paid Family Leave. The paper uses data from the 2000 Census and the 2000-2013 waves of the American Community Survey to estimate the effects of the program on fathers? leave-taking. The results show that after the program fathers of infants were 46% more likely to be on leave during the survey week. In cases that both parents work, the program increased both father-only leave-taking and joint leave-taking (i.e., both parents on leave at the same time), mainly for fathers of first-born children.

Rossin-Slater et al. [2013] use a differences-in-differences approach to evaluate the same program in California, but using a different data source, the March Current Population Survey data from 1999-2010. The authors examine how the program affected leave-taking by mothers following childbirth and the subsequent labor market outcomes. The evidence suggests that the Californian program doubled (from an average of three to six weeks) the overall use of maternity leave for new mothers. Moreover, they also find that the program increased both the usual weekly work hours and wage incomes of employed mothers of one-to-three year-old children.

Han et al. [2009] describe trends in parents' employment and leave-taking after birth of a newborn and analyze how these behaviors are associated with parental leave policies. This study uses data from the Current Population Survey (CPS) Fertility Supplement for the period 1987-2004, given that during this period policies were expanded at both state and federal level. Authors provide evidence indicating these expansions are correlated with employment and leave-taking for both parents. The results also suggest that maternity leave expansions have increased the amount of time that new mothers and fathers spend on leave.

The literature that has studied this topic for Brazil is still very incipient, even

though the country has unique characteristics that make it an interesting case for study. de Carvalho et al. estimate the effects of one change in maternity leave legislation, that occurred after the Constitution of 1988, on women's wages and employment in Brazil. It was precisely this legislation that extended the maternity leave period from 12 weeks to 120 days. The authors use a differences-in-differences strategy and Monthly Employment Survey (PME) data from 1986 to 1991. The women of fertile age (considered the treatment group) are compared with two control groups: men in the same age group and women of non-fertile age. According this study, the increase in the leave-taking period did not significantly affect either employment or wages of the women in the treatment group.

4   Data

In this paper, we use RAIS (Relação Anual de Informações Sociais), which is the Brazilian matched employer-employee dataset provided by the Ministry of Labor. One of the main objectives of RAIS is to provide statistics regarding the Brazilian formal labor market, containing a set of variables on both firms' and employees' characteristics as well as about the characteristics of the employment contract.

Although RAIS is an annual dataset, we can extrapolate monthly information on maternity leave and employment status, by identifying dates of the maternity leave period and admission/resignation dates for each employer-employee pair. We observe the exact month when each woman started the maternity leave (if any) and her employment situation over time. Thus, we build two monthly panels of women by considering: 1) those women who took maternity leave in 2009 (followed during 2006-2012) and 2) those women who took maternity leave in 2012 (followed during 2009-2015). This division considers the time before and after the *Empresa Cidadã Program*, which is the main national policy to encourage the extension of the period of maternity leave.

We impose some restrictions on our datasets, such as: 1) we restrict the analyses to those women who took one (and only one) maternity leave during the year; 2) we select only women who worked in a private companies (at the time of the leave-taking) and 3)

we choose women who were from 25 to 35 years old (at the time of the leave-taking);[10] 4) we restrict our analysis to those leave-taking that lasted in the total[11]: 120 days (conventional maternity leave period, *Default*), 135 days (conventional maternity leave period plus two weeks, also *Default*) or 180 days (*Extended* maternity leave period) and 5) we also exclude those women who had missing data in the admission/resignation variable. After all restrictions, a total of 247,455 women remained in our dataset, comprising 122,174 who took maternity leave in 2009 and 125,281 who took maternity leave in 2012.

5 Empirical Strategy

We analyze two large panel of women with monthly observations on labor market outcomes as well as information on the maternity leave period (beginning and end). We consider binary indicators for *Employment* (E_{it}), *Separation* (S_{it}) and *Hiring* (H_{it}). The first outcome of interest, E_{it}, is equal 1 if the individual i is employed at t and 0 otherwise. Based on E_{it} we define $S_{it} = E_{it} \times (1 - E_{it+1})$ and $H_{it} = E_{it+1} \times (1 - E_{it})$. Therefore, S_{it} (H_{it}) indicates that the individual i is employed (unemployed) at t but no longer at $t + 1$. Notice that the triad (E_{it}, S_{it}, H_{it}) completely describes the dynamics of employment according to the following identity:

$$E_{it} \equiv E_{it-1} + H_{it-1} - S_{it-1} \tag{1}$$

Let y_{it} denote generically the outcomes and, in order to give some intuition underlying our econometric model, define the individual leave-taking cohort, l, as the year-month of the leave-taking and relative event time, r, as the number of months between calendar time, t, and the moment of leave-taking l (i.e., $r = t - l$). Then, we can

---

[10]The first restriction is required because our empirical approach requires that the time of the event is uniquely identified, in order to calculate the relative distances from each month to the time of the event for every individual. The second restriction considers the fact that private companies have very different dynamics relative to the public sector, not only with respect to maternity leave policy, but also concerning the way of admission and the chances of being hired/separated for any reason.

[11]Actually, we use one (2-days) margin of error to each one of them, in other words: 118-122, 133-137 or 178-182 days. This filter is important to exclude cases in which we are not interested in studying (such as abortion, adoption, etc.), as well as to avoid potential mistakes in the leave-taking date information (start and finish) when someone filled out the form. This filter discards approximately 7% from both databases.

define the event time r as the number of months since the month in which the maternity leave started. Using this notation, we can write the following fully nonparametric model:

$$y_{it} = \delta_l + \gamma_t + \mu_r + \epsilon_{it} \tag{2}$$

Where δ_l are leave-taking cohort fixed effects; γ_t are calendar time fixed effects, and μ_r are fixed effects for months relative to the moment of leave-taking, which takes place at the month 0. Thus, an individual-year observation is indexed by leave-taking cohort l, year-month t and relative event time r. There is a well-known problem in this type of analysis: leave-taking cohort is collinear with the combination of t and r and we cannot separately identify the cohort, calendar time and relative event time effects. Therefore, in order to identify Equation (2), at least one set of fixed effects must be assumed to be the same. We assume that there are no leave-taking cohort effects, i.e., $\delta_l = 0$.

The key coefficients of interest refer to the pattern on the μ_r, which estimate the outcome at a given r relative to the omitted month of the leave-taking (in this paper, μ_0). Time fixed effects control for secular trends in the labor market outcomes. As the baseline non-parametric event study omits the month of the leave-taking (i.e., μ_0), all coefficients $\mu_r's$ must be interpreted relative to this omitted month. We follow women from prior 47 months to 47 months after the moment when they took maternity leave ($r = -47, ..., -1, 0, +1, ..., +47$). We expanded the basic model in order to control for both individual and firm characteristics:

$$y_{itj} = \gamma_t + \sum_{r=-47}^{r=-1} \mu_r + \sum_{r=1}^{r=47} \mu_r + \lambda_j + X'_{ij}\beta + \epsilon_{itj} \tag{3}$$

Where λ_j are firm fixed effects and X_{ij} are individual characteristics (such as region, sector, race, education and age). Both of them are considered at the time of the leave-taking and j indexes the firm where the woman was working at the time of the event. The identifying assumption in Equation (3) is that, conditional on taking a maternity leave within a 4-year period, the timing of leave-taking is uncorrelated with the outcome, conditional on the calendar time fixed effects as well as firm and individual

9

characteristics.[12]

We also analyse some heterogeneous effects, based on the women's level of education, divided as: less than middle school, middle school, high school and more than high school. Finally, we study the effect of the extension in the period of maternity leave for 60 days (from 120 to 180 days), using a difference-in-difference strategy and considering those companies that changed their maternity leave policies between 2009 and 2012.[13]

6   Results

Table 2 shows the effects of the maternity leave on women's formal employment trajectory over time. The first column refers to the time elapsed (in months) since the event (labeled as month 0), considering from 3 years before to 3 years after and selected months around the event. For columns 1-4 we sequentially add firm fixed effects (column 2), individual controls (column 3) and both together (column 4). Finally, in column 5 we add individual fixed effects as a robustness check. The results in columns 1-5 do not change substantially and our preferred specification is in column 4, so that hereafter we narrow our analysis to consider only this specification. Results show that the likelihood of employment increases monotonically since three years before the maternity leave, reaching the maximum at the moment of the event (since $\mu_0 = 0$). During the maternity leave period, the employment is stable, but falls sharply mainly after the period of job protection, which is legally guaranteed for 5 months. After one year from the event, the employment seems to stabilize again, but three years after it, almost half of women were out of the formal labor market. The level of employment observed three years after was almost 6.8 (48.41%-41.6%) percentage points lower than the level observed three years earlier the event.

Table 3 shows the estimation of our preferred specification (column 4) for the years

---

[12]In order to check the robustness of the results, we explore an alternative non-parametric event study with individual fixed effects. Notice that this specification allows different expected outcomes across individuals (including those in different leave-taking cohorts). We estimate the following model: $y_{it} = \gamma_t + \alpha_i + \sum_{r=-47}^{r=-1} \mu_r + \sum_{r=2}^{r=47} \mu_r + \epsilon_{it}$. Where α_i are individual fixed effects. Notice that this specification requires an alternative normalization for identification. We impose $\mu_0 = \mu_1 = 0$, which would be the additional restriction to our baseline specification (that before only imposed $\mu_0 = 0$).

[13]The way as we combine the event study approach with a difference-in-differences strategy will be better explained in the next section.

2009 and 2012, as well as for the three outcomes of interest in this study: employment, separation and hiring. First, it is worth noting that for both years (2009 and 2012) the pattern of the results are very similar. Thus, we do not focus in results for an specific year, only considering each dependent variable.

The effect on employment was already described in the Table 2. Regarding separations, the results show that the probability of separation starts to fall since 12 months before the event, especially around the ninth month (conception). It reaches zero at the time of the event and stays significantly around zero during the first two months of the maternity leave. Notice that this result means that the employment was on average guaranteed for three months, since separation here means being employed at 't' but unemployed at 't + 1'. Moreover, it is worth remembering that, depending on mother's choice, the maternity leave can start one month before the birth date. Although statistically significant, the effects on separation for two and three months after the event are remarkably close to zero. After 4 months from the event, the probability of separation (not employed next month) increases approximately 5 percentage points and in the consecutive month it reaches more than 10%. After three years, the probability of separation is higher than its level three years before the event.

The likelihood of hiring grows subtly until one year before the leave-taking, when it begins to drop to zero in the month of maternity leave. During the first five months after the leave-taking, the probability of hiring is still statistically around zero, meaning that during this period basically does not happen hiring. After one year from the leave-taking, the probability of hiring seems to return to previous levels. Figures 1 and 2 give the complete pattern of the results presented in Table 3.

6.1 Separation by Causes and Initiative

We also divide the separation variable according to the cause (Fair or No Fair) of the separation as well as who decided to do it (Employer's or Employee's Initiative). Thus, we divide separation in 5 mutually exclusive categories: Fair and Employer's Initiative, No Fair and Employer's Initiative, Fair and Employee's Initiative, No Fair and Employee's Initiative and other. This division considers the effects of maternity leave, taking into account the employees and employers choices and it works as a decomposition of the

pattern observed on separation.

The results on Table 4 refer to those women who took maternity leave in 2009. The column 2 shows that, unlike what was shown on Table 3, there is no more statistically significant effect for two months after the beginning of maternity leave. In addition, the effect on separation in the third month (0.36%) is equally explained by No Fair and Employer's Initiative (0.1%) and No Fair and Employee's Initiative (0.11%). In the fourth month after the maternity leave starts, we observe that more than half (2.56%) of the effect on separation (4.8%) comes from No Fair and Employee's Initiative. It is worth mentioning that this period (5 months including the month of the event) refers to the job protection period. After that, there is an increase in the relative importance of separations No Fair and Employer's Initiative. For instance, we observe an effect of 12.6% on separation in the sixth month after the leave-taking, of which 10.74 % comes from separations No Fair and Employer's Initiative.

6.2 Heterogeneous Effect

We also analyze heterogeneous effects based on the level of education received by the employees, divided as: less than middle school, middle school, high school and more than high school. Figure 3 shows that the pattern of employment over time is very similar for all educational levels. However, the probability of being employed is systematically higher for the more educated groups. Similarly, Figure 4 also shows a similar pattern, among educational groups, on the likelihood of employment separation. However, we verify that the probability of separation after the end of the period of maternity leave seems to be lower for the more educated groups, indicating that this group is better assured regarding job placement in the formal labor market. Figure 5 shows that hiring for those less educated women tends to increase relatively faster up to 12 months before maternity leave, especially whether we compare with the group high school or more.

6.3 Effects of Extended Maternity Leave

In order to measure the effects of extended maternity leave, we combine the previous event-study strategy with a differences-in-differences approach. First, based on the panel of women who took maternity leave in 2012, we select only those ones that lasted

for 180 days. We identify the companies where these women were working at that moment and we find them in the panel of woman who took maternity leave in 2009. Our analysis is restricted only on those companies that were in both panels (2009 and 2012) and that offered 120 days of maternity leave in 2009, but 180 days in 2012. Finally, we pool both restricted databases and create two indicator variables: 1) $Default$ which is equal 1 in case of maternity leave taken in 2009 (i.e,for 120 days) and zero otherwise and 2) $Extended$ which is equal 1 in case of maternity leave taken in 2012 (i.e., for 180 days) and zero otherwise. Thus, by definition, $Default = 1 - Extended$. Finally, we modify the equation 3 in order to incorporate a difference-in-differences approach. So we estimate:

$$y_{itj} = \gamma_t + \sum_{r \neq 0} \theta_r \times Default + \sum_{r \neq 0} \phi_r \times Extended + \lambda_j + X'_{ij}\beta + \epsilon_{itj} \qquad (4)$$

In this equation we are interested in analyzing the differences in the pattern of the coefficients θ_r and ϕ_r. Table 5 shows the estimation of this equation on employment, separation and hiring. In the first three columns we show the coefficients θ_r which consider those women who took maternity leave for 120 days in 2009 (but were working in companies that will extend the period of maternity leave in 2012). Similarly, in the columns 4-6 we have the ϕ_r estimated for women who took extended maternity leave in 2012 (but were working for companies that had not extended maternity leave in 2009). The pattern observed in both cases is quite similar, but with women who took extended maternity leave being more protected in their job positions. For instance, considering six months after the leave-taking starts, women who had the rest period extended were 7.5 percentage point more likely of being employed. Moreover, four (five) months after the event, the probability of separation from the job was 1.56 (3.8) percentage points lower for those women who had extended leave-taking period.

7   Conclusion

The recent increase on feminine participation in the labor market has triggered a series of changes on labor legislations in most of countries. Consequently, the number of researches interested in measuring the effects of the maternity leave on women's life

is still increasing. An important objective of paid maternity leave is to allow mothers balance their work and family responsibilities, since in most cases women are guaranteed to return to their same (or similar) job positions after the maternity leave ends. Furthermore, the provision of paid maternity leave may not only help mothers recover from childbirth but also further child health and development.

In this paper we investigate how a paid maternity leave affects women's employment trajectories, focusing on Brazilian formal labor market. We use an event study approach and administrative data on women who took maternity leave during 2009 and 2012. For both years, the results show an inverted U-shaped employment pattern which peaks at the time of leave-taking. Although the maternity leave in Brazil has ensured job stability during a certain period of time, our findings suggest that it is not sufficient to retain women in the workforce in the long term. We also verify that the policies of extending the maternity leave have been effective to ensure job protection for women who had baby, at least during some months after the maternity leave period finishes.

Since our preliminary results indicate that the Brazilian maternity leave policy is not effective in retaining women in the workforce to long term, we intend to investigate the interaction of this policy with availability of public services related to newborns and children. The availability of lots of record allows estimating differential impacts of the maternity leave policy across cities with different coverages of public daycare services. Brazil has experienced substantial increase in daycare provision, and we expect work attachment to be higher in regions with higher daycare availability.

We also plan to explore one potential heterogeneous effect based on the firm size by estimating our econometric model around the margin of 30 women employees. According to the Brazilian law, companies that have more than 30 women over sixteen must provide daycare assistance for the mothers, setting up an additional cost for these companies. Thus we plan to estimate the effect of this policy by considering how the pattern of women's employment changes around the vicinity of this threshold.

References

Ann Bartel, Maya Rossin-Slater, Christopher Ruhm, Jenna Stearns, and Jane Waldfogel. Paid family leave, fathers leave-taking, and leave-sharing in dual-earner households. Technical report, National Bureau of Economic Research, 2015.

Gordon B Dahl, Katrine V Løken, Magne Mogstad, and Kari Vea Salvanes. What is the case for paid maternity leave? *Review of Economics and Statistics*, (0), 2013.

Sandro Sacchet de Carvalho, Sérgio Firpo, and Gustavo Gonzaga. *Os Efeitos da Licença Maternidade sobre Salário e Emprego da Mulher no Brasil*. PhD thesis.

Wen-Jui Han, Christopher Ruhm, and Jane Waldfogel. Parental leave policies and parents' employment and leave-taking. *Journal of Policy Analysis and Management*, 28(1):29–54, 2009.

Maya Rossin-Slater, Christopher J Ruhm, and Jane Waldfogel. The effects of california's paid family leave program on mothers leave-taking and subsequent labor market outcomes. *Journal of Policy Analysis and Management*, 32(2):224–245, 2013.

Table 1: Descriptive Statistics for Women considering Labor Market of Brazil

VARIABLES	Women in fertile age, 15-49 years old				Women in fertile age and Legally employed in priv. sec.				Women of 25-35 years old and Legally employed in priv. sec.				Additionally, who had Child in the last 12 months			
	2009		2012		2009		2012		2009		2012		2009		2012	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Head of Family	0.22	0.42	0.25	0.43	0.25	0.43	0.26	0.44	0.25	0.43	0.27	0.44	0.26	0.44	0.28	0.45
Urban	0.86	0.35	0.87	0.34	0.96	0.19	0.97	0.16	0.96	0.19	0.97	0.16	0.95	0.22	0.98	0.13
Black or Mulatto	0.51	0.50	0.53	0.50	0.39	0.49	0.43	0.49	0.39	0.49	0.43	0.50	0.42	0.49	0.40	0.49
Age in years	31.04	9.94	31.30	9.97	30.78	8.33	31.02	8.47	29.52	3.14	29.69	3.12	29.55	3.10	29.79	3.01
Worked on reference week	0.56	0.50	0.57	0.50	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Employed in private sector	0.41	0.49	0.47	0.49	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Legally employed	0.39	0.49	0.45	0.50	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Legally employed in priv. sec.	0.31	0.46	0.38	0.48	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
>30 min. from home to work	0.23	0.42	0.26	0.44	0.35	0.48	0.37	0.48	0.35	0.48	0.37	0.48	0.37	0.48	0.36	0.48
Hours of work per week	36.97	13.52	37.43	12.87	42.47	7.46	41.79	8.19	42.54	7.35	42.02	7.88	42.49	6.78	41.20	8.54
Full time	0.62	0.48	0.66	0.47	0.88	0.33	0.87	0.34	0.89	0.32	0.89	0.32	0.89	0.31	0.86	0.34
Contributed to social security	0.57	0.50	0.65	0.50	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
No of years worked on this job	5.03	6.43	4.93	6.32	3.60	4.61	3.41	4.49	3.18	3.39	3.03	3.18	4.29	3.84	4.14	3.54
Age when started working	15.62	4.57	16.17	4.40	16.49	3.79	16.79	3.69	16.71	3.74	17.14	3.62	16.54	3.43	17.10	3.43
Economically active	0.67	0.47	0.65	0.48	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Did household chores	0.90	0.30	0.89	0.31	0.85	0.36	0.85	0.36	0.86	0.35	0.86	0.34	0.94	0.23	0.90	0.30
Tried to find work last month	0.02	0.14	0.01	0.11	0.02	0.15	0.02	0.15	0.02	0.15	0.01	0.12	0.01	0.10	0.01	0.10
Student	0.21	0.41	0.19	0.39	0.15	0.35	0.14	0.35	0.12	0.33	0.11	0.32	0.05	0.22	0.05	0.22
Literate	0.96	0.20	0.97	0.18	1.00	0.05	1.00	0.05	1.00	0.04	1.00	0.04	1.00	0.00	1.00	0.00
Years of schooling	9.75	3.99	10.21	3.86	11.82	3.00	11.92	2.96	12.18	2.91	12.40	2.83	12.44	2.80	12.35	2.65
Income from main job	752	1,100	1,075	1,555	914	846	1,196	1,109	964	811	1,262	1,080	1,086	1,070	1,253	960
Income from all occupations	791	1,694	1,110	1,611	939	904	1,218	1,158	991	865	1,285	1,137	1,106	1,100	1,265	983
Income from all sources	517	1,370	718	1,383	965	904	1,248	1,173	1,016	876	1,312	1,136	1,126	1,104	1,288	976
Household income *per capita*	2,176	3,188	2,827	3,874	2,825	2,716	3,609	4,052	2,887	2,917	3,629	4,513	2,958	2,793	3,389	2,673
Child in the last 12 months	0.05	0.22	0.05	0.22	0.03	0.17	0.03	0.18	0.04	0.20	0.05	0.21	1.00	0.00	1.00	0.00
Sample Size	112,172		100,308		18,926		20,458		8,287		8,928		329		414	
Population	53,937,676		54,809,597		9,526,665		11,634,441		4,141,254		5,046,861		165,614		232,727	

16

Table 2: Maternity Leave Effect on Employment - 2009

Months since the event	(1)	(2)	(3)	(4)	(5)
-36	-0.3803***	-0.4175***	-0.3899***	-0.4160***	-0.4295***
	(0.0028)	(0.0032)	(0.0028)	(0.0032)	(0.0566)
-24	-0.3232***	-0.3479***	-0.3296***	-0.3470***	-0.3559***
	(0.0025)	(0.0026)	(0.0024)	(0.0026)	(0.0380)
-12	-0.1848***	-0.1972***	-0.1880***	-0.1967***	-0.2012***
	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0194)
-9	-0.1337***	-0.1430***	-0.1361***	-0.1426***	-0.1460***
	(0.0020)	(0.0019)	(0.0020)	(0.0019)	(0.0148)
-6	-0.0735***	-0.0797***	-0.0751***	-0.0794***	-0.0817***
	(0.0019)	(0.0017)	(0.0019)	(0.0017)	(0.0102)
+1	-0.0014	-0.0003	-0.0011	-0.0004	-
	(0.0018)	(0.0016)	(0.0018)	(0.0016)	-
+2	-0.0031*	-0.0011	-0.0026	-0.0011	-0.0004
	(0.0018)	(0.0016)	(0.0018)	(0.0016)	(0.0027)
+3	-0.0052***	-0.0021	-0.0044**	-0.0022	-0.0011
	(0.0018)	(0.0016)	(0.0018)	(0.0016)	(0.0041)
+4	-0.0095***	-0.0054***	-0.0084***	-0.0055***	-0.0040
	(0.0019)	(0.0017)	(0.0018)	(0.0017)	(0.0056)
+5	-0.0582***	-0.0530***	-0.0568***	-0.0532***	-0.0514***
	(0.0019)	(0.0017)	(0.0019)	(0.0017)	(0.0071)
+6	-0.1602***	-0.1540***	-0.1586***	-0.1543***	-0.1521***
	(0.0019)	(0.0017)	(0.0019)	(0.0017)	(0.0086)
+12	-0.4993***	-0.4869***	-0.4961***	-0.4874***	-0.4829***
	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0179)
+24	-0.5073***	-0.4826***	-0.5009***	-0.4835***	-0.4746***
	(0.0025)	(0.0026)	(0.0024)	(0.0026)	(0.0365)
+36	-0.5198***	-0.4827***	-0.5102***	-0.4841***	-0.4707***
	(0.0028)	(0.0032)	(0.0028)	(0.0032)	(0.0551)
Time FE	Yes	Yes	Yes	Yes	Yes
Firm FE		Yes		Yes	
Individual FE					Yes
Controls			Yes	Yes	

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Maternity Leave Effect on Employment, Separation and Hiring

Months since the event	Employment	2009 Separation	Hiring	Employment	2012 Separation	Hiring
-36	-0.4160***	0.0190***	0.0247***	-0.3495***	0.0213***	0.0238***
	(0.0032)	(0.0011)	(0.0011)	(0.0031)	(0.0011)	(0.0011)
-24	-0.3470***	0.0197***	0.0288***	-0.3147***	0.0237***	0.0279***
	(0.0026)	(0.0009)	(0.0009)	(0.0025)	(0.0009)	(0.0009)
-12	-0.1967***	0.0153***	0.0323***	-0.1911***	0.0182***	0.0331***
	(0.0020)	(0.0007)	(0.0007)	(0.0020)	(0.0007)	(0.0007)
-9	-0.1426***	0.0082***	0.0280***	-0.1369***	0.0086***	0.0281***
	(0.0019)	(0.0006)	(0.0006)	(0.0018)	(0.0006)	(0.0006)
-6	-0.0794***	0.0019***	0.0203***	-0.0738***	0.0027***	0.0195***
	(0.0017)	(0.0006)	(0.0006)	(0.0017)	(0.0006)	(0.0006)
+1	-0.0004	0.0005	0.0001	0.0004	0.0006	0.0002
	(0.0016)	(0.0006)	(0.0005)	(0.0016)	(0.0006)	(0.0006)
+2	-0.0011	0.0011**	0.0004	0.0004	0.0015***	0.0004
	(0.0016)	(0.0006)	(0.0005)	(0.0016)	(0.0006)	(0.0006)
+3	-0.0022	0.0036***	0.0006	-0.0003	0.0056***	0.0009
	(0.0016)	(0.0006)	(0.0006)	(0.0016)	(0.0006)	(0.0006)
+4	-0.0055***	0.0481***	0.0008	-0.0047***	0.0509***	0.0009
	(0.0017)	(0.0006)	(0.0006)	(0.0016)	(0.0006)	(0.0006)
+5	-0.0532***	0.1029***	0.0022***	-0.0543***	0.1019***	0.0024***
	(0.0017)	(0.0006)	(0.0006)	(0.0017)	(0.0006)	(0.0006)
+6	-0.1543***	0.1260***	0.0039***	-0.1533***	0.1179***	0.0051***
	(0.0017)	(0.0006)	(0.0006)	(0.0017)	(0.0006)	(0.0006)
+12	-0.4874***	0.0285***	0.0228***	-0.4649***	0.0322***	0.0258***
	(0.0020)	(0.0007)	(0.0007)	(0.0020)	(0.0007)	(0.0007)
+24	-0.4835***	0.0232***	0.0244***	-0.4717***	0.0273***	0.0255***
	(0.0026)	(0.0009)	(0.0009)	(0.0025)	(0.0009)	(0.0009)
+36	-0.4841***	0.0229***	0.0231***	-0.4952***	0.0268***	0.0245***
	(0.0032)	(0.0011)	(0.0011)	(0.0031)	(0.0011)	(0.0011)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Maternity Leave Effect on Separation by Cause and Initiative - 2009

Months since the event	Fair & Employer's Init.	No Fair & Employer's Init.	Fair & Employee's Init.	No Fair & Employee's Init.	other
-36	0.0000	0.0083***	0.0001***	0.0018***	0.0087***
	(0.0001)	(0.0009)	(0.0000)	(0.0004)	(0.0005)
-24	-0.0000	0.0084***	0.0000	0.0021***	0.0091***
	(0.0001)	(0.0007)	(0.0000)	(0.0004)	(0.0004)
-12	0.0001	0.0032***	0.0000	0.0010***	0.0110***
	(0.0001)	(0.0006)	(0.0000)	(0.0003)	(0.0003)
-9	-0.0000	0.0009*	0.0000	0.0003	0.0070***
	(0.0001)	(0.0005)	(0.0000)	(0.0003)	(0.0003)
-6	-0.0000	-0.0005	0.0000	-0.0002	0.0027***
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+1	0.0000	0.0005	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+2	0.0000	0.0009*	0.0000	0.0000	0.0002
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+3	0.0000	0.0011**	-0.0000	0.0010***	0.0015***
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+4	0.0002***	0.0177***	0.0001***	0.0256***	0.0045***
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+5	0.0007***	0.0712***	0.0001***	0.0253***	0.0056***
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+6	0.0014***	0.1074***	0.0001***	0.0121***	0.0050***
	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0002)
+12	0.0003***	0.0214***	0.0000*	0.0028***	0.0039***
	(0.0001)	(0.0006)	(0.0000)	(0.0003)	(0.0003)
+24	0.0002***	0.0140***	-0.0000	0.0039***	0.0051***
	(0.0001)	(0.0007)	(0.0000)	(0.0004)	(0.0004)
+36	0.0001	0.0139***	-0.0001**	0.0035***	0.0053***
	(0.0001)	(0.0009)	(0.0000)	(0.0004)	(0.0005)
Time FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

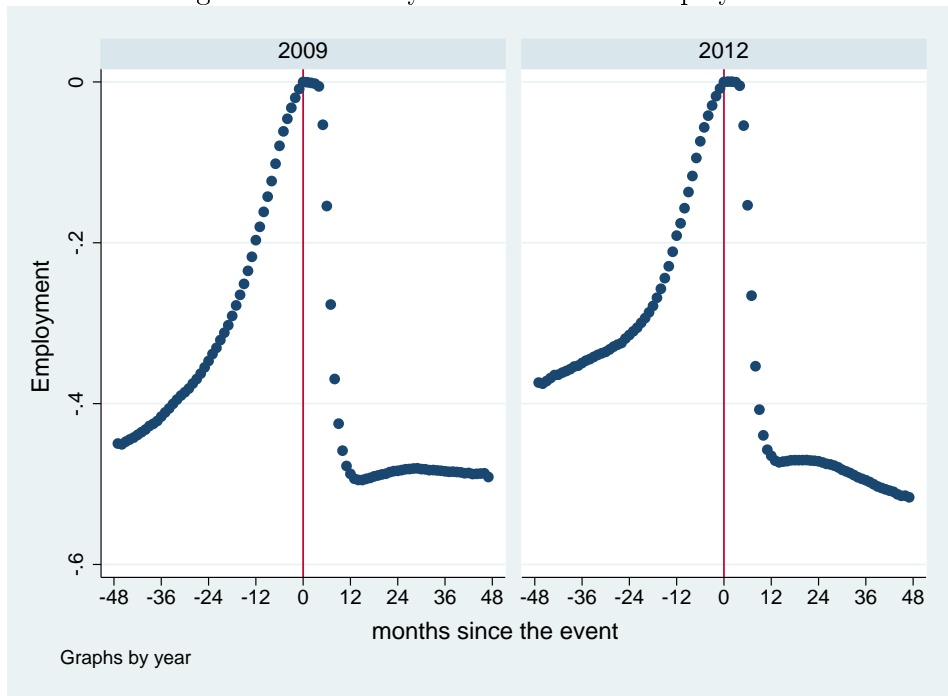Figure 1: Maternity Leave Effect on Employment

Figure 2: Maternity Leave Effect on Separation and Hiring
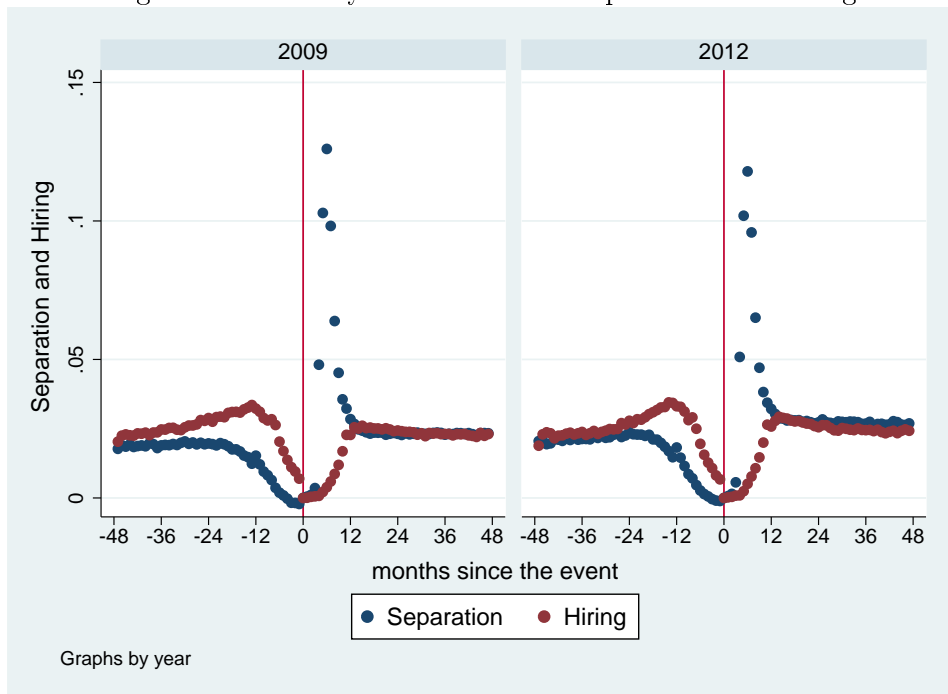
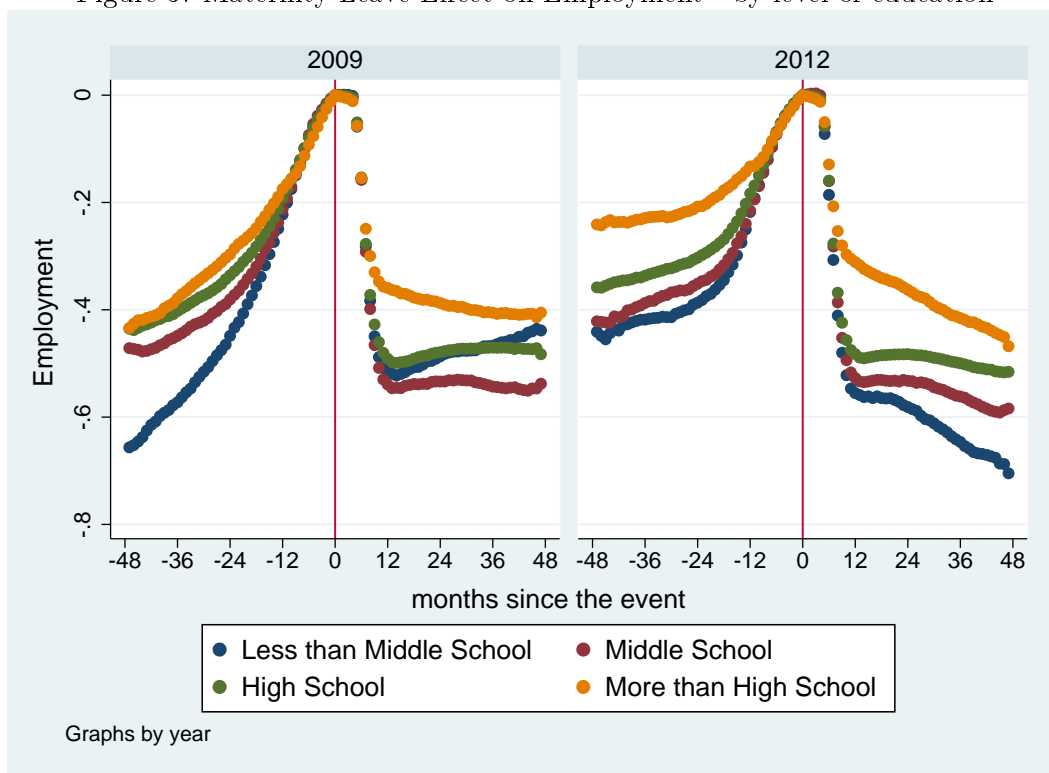Figure 3: Maternity Leave Effect on Employment - by level of education

Figure 4: Maternity Leave Effect on Separation - by level of education
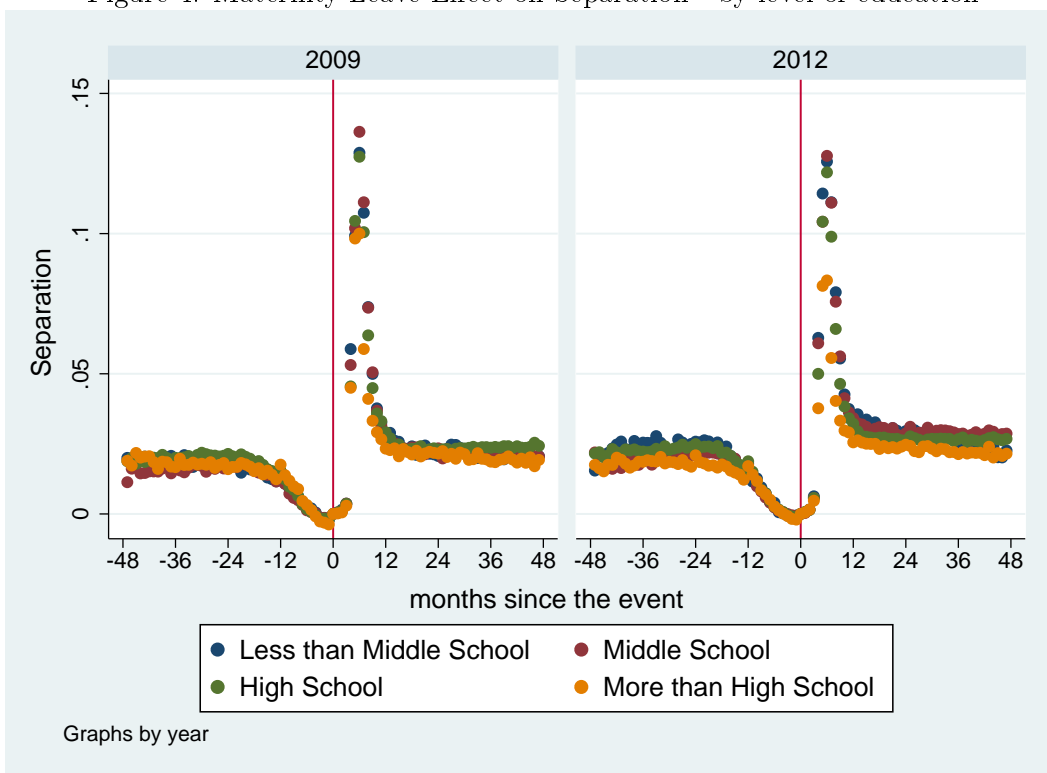

Graphs by year

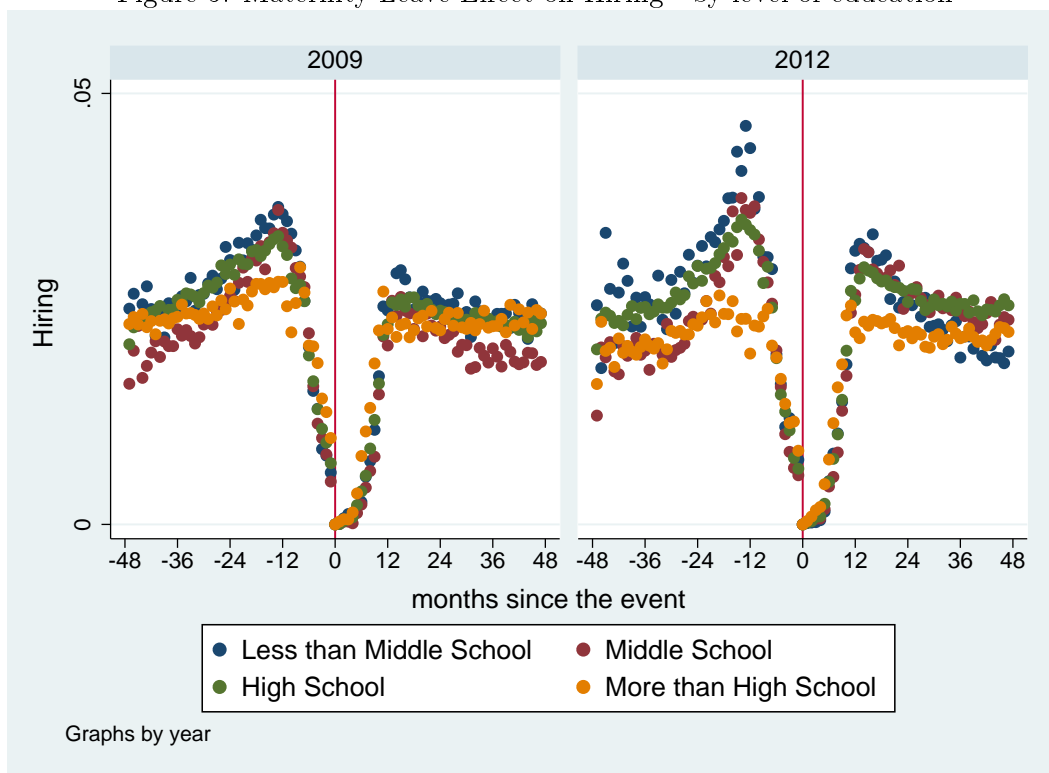Figure 5: Maternity Leave Effect on Hiring - by level of education

Table 5: Maternity Leave Effect on Employment, Separation and Hiring: Difference-in-Differences Estimation

Months since the event	2009 (Default: 120 Days)			2012 (Extended: 180 Days)			Diff (Extended - Default)		
	Employment	Separation	Hiring	Employment	Separation	Hiring	Employment	Separation	Hiring
-36	-0.3145***	0.0206**	0.0449***	-0.1665***	0.0048	0.0073	0.1480***	-0.0159	-0.0376***
	(0.0266)	(0.0084)	(0.0084)	(0.0237)	(0.0075)	(0.0075)	(0.0344)	(0.0109)	(0.0109)
-24	-0.2000***	0.0137*	0.0328***	-0.1171***	0.0127*	0.0116*	0.0829***	-0.0010	-0.0212**
	(0.0231)	(0.0073)	(0.0073)	(0.0215)	(0.0068)	(0.0068)	(0.0311)	(0.0098)	(0.0099)
-12	-0.0709***	0.0106*	0.0203***	-0.0609***	0.0166***	0.0071	0.0100	0.0060	-0.0132
	(0.0192)	(0.0061)	(0.0061)	(0.0193)	(0.0061)	(0.0061)	(0.0272)	(0.0086)	(0.0086)
-9	-0.0608***	0.0071	0.0167***	-0.0519***	0.0060	0.0048	0.0089	-0.0011	-0.0120
	(0.0181)	(0.0057)	(0.0057)	(0.0188)	(0.0059)	(0.0059)	(0.0260)	(0.0082)	(0.0082)
-6	-0.0415**	0.0021	0.0088	-0.0409**	0.0008	0.0057	0.0006	-0.0013	-0.0030
	(0.0171)	(0.0054)	(0.0054)	(0.0182)	(0.0057)	(0.0058)	(0.0250)	(0.0079)	(0.0079)
+1	-0.0030	-0.0014	0.0001	-0.0001	0.0006	0.0010	0.0030	0.0020	0.0009
	(0.0162)	(0.0051)	(0.0052)	(0.0177)	(0.0056)	(0.0056)	(0.0240)	(0.0076)	(0.0076)
+2	-0.0048	-0.0002	-0.0004	-0.0001	0.0020	0.0014	0.0047	0.0022	0.0018
	(0.0163)	(0.0051)	(0.0052)	(0.0178)	(0.0056)	(0.0056)	(0.0241)	(0.0076)	(0.0076)
+3	-0.0085	-0.0013	-0.0003	-0.0018	0.0042	0.0029	0.0067	0.0055	0.0032
	(0.0164)	(0.0052)	(0.0052)	(0.0179)	(0.0057)	(0.0057)	(0.0243)	(0.0077)	(0.0077)
+4	-0.0112	0.0189***	-0.0009	-0.0044	0.0033	0.0039	0.0068	-0.0156**	0.0047
	(0.0165)	(0.0052)	(0.0052)	(0.0181)	(0.0057)	(0.0057)	(0.0245)	(0.0077)	(0.0078)
+5	-0.0348**	0.0471***	-0.0007	-0.0052	0.0091	0.0051	0.0295	-0.0380***	0.0059
	(0.0167)	(0.0053)	(0.0053)	(0.0183)	(0.0058)	(0.0058)	(0.0247)	(0.0078)	(0.0078)
+6	-0.0865***	0.0745***	-0.0006	-0.0108	0.0547***	0.0064	0.0757***	-0.0198**	0.0070
	(0.0169)	(0.0053)	(0.0053)	(0.0185)	(0.0059)	(0.0059)	(0.0250)	(0.0079)	(0.0079)
+12	-0.2882***	0.0193***	0.0082	-0.2556***	0.0359***	0.0197***	0.0325	0.0167*	0.0114
	(0.0181)	(0.0057)	(0.0057)	(0.0208)	(0.0066)	(0.0066)	(0.0274)	(0.0086)	(0.0087)
+24	-0.3858***	0.0169***	0.0282***	-0.3166***	0.0318***	0.0376***	0.0692**	0.0149	0.0095
	(0.0204)	(0.0064)	(0.0065)	(0.0249)	(0.0078)	(0.0079)	(0.0316)	(0.0100)	(0.0100)
+36	-0.3762***	0.0130*	0.0166**	-0.3407***	0.0309***	0.0360***	0.0355	0.0178	0.0193*
	(0.0226)	(0.0071)	(0.0072)	(0.0287)	(0.0090)	(0.0091)	(0.0353)	(0.0111)	(0.0112)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1