The Incidence of Workplace Breastfeeding Benefits*

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Abstract

This paper investigates the causal impact of providing unpaid break time and a special space for nursing employees to express breastmilk at the workplace on women's feeding and labor market outcomes. I exploit plausibly exogenous variation in timing of state mandates on workplace lactation support, using the National Immunization Survey and the Current Population Survey data. I find that the workplace benefits increase the amount of breastfeeding: the percentage of mothers who breastfeed increased by 0.8 percentage points, and the duration of breastfeeding increased by 5.5%. With the benefits, infant mothers work for 3.3% longer hours per day and receive a 3.8% higher hourly wage. For a more productive mother, the working hours increase less, and the hourly wage increases more, than that for a less productive one. The results are consistent with a standard search model as in Pissarides (2000) extended to include firms' provision of workplace breastfeeding benefits, which increases firms' cost of hiring but reduces workers' disutility of breastfeeding under employment.

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1 Introduction

What's the effect on employment if workers of a demographically identifiable group are more costly to hire? In particular, what's the effect on nursing employees' hours working and wages if the employer provides workplace benefits, such as unpaid break time and a special space to express breastmilk at the workplace? Will these benefits encourage more mothers to breastfeeding and breastfeed for a longer duration?

Despite the established benefits of breastfeeding for both the mother and the child, the initiation rate and the duration of breastfeeding among the U.S. women remain lower and shorter than that recommended by the American Academy of Pediatrics. The need to return to work being the largest barrier for breastfeeding for longer durations, and women's labor force participation continuing increasing, how friendly the work environment is towards breastfeeding affects women's breastfeeding decisions.

This paper first presents a model, which extends the standard search model as in Pissarides (2000) by introducing firms' provision of workplace breastfeeding benefits. The benefits increase the firms' costs of hiring but reduce workers' opportunity costs of breastfeeding at work. The worker and the employer bargain to determine the hours working and hourly wage; the nursing employee determines the maximum level of breastfeeding, given the job contract. The model predicts that nursing employees are more attached to work: they work more, receive higher wages, and breastfeed more. The mechanism works though two channels. First, it is less costly for workers to breastfeed at work; the workers can afford more breastfeeding, leisure and hours work (consumption). Second, as the employer pays the cost of the ben-

efits, workers need to work more hours to compensate for the costs; workers enjoy a higher wage as the additional real product is shared between the worker and the employer. The model also predicts that the effects differ for workers with different levels of productivity.

The paper then tests for the predictions using a difference-in-differences framework, exploiting plausibly exogenous variation in timing of the state level mandates that require employers to provide workplace lactation support. 24 states and the District of Columbia passed the law in different years during 1995 and 2010. Using the National Immunization Survey and the March Current Population Survey, I find that the workplace benefits increase the amount of breastfeeding: the percentage of mothers who breastfeed increased by 0.8 percentage points, and the number weeks of breastfeeding increased by 5.5%. With the benefits, infant mothers work for longer hours per day (3.3% longer) and receive higher hourly wages (3.8% higher). For a more productive mother, or a mother with a higher level of education, the working hours increase less, and the hourly wage increases more, than that for a less productive one.

This paper contributes to four strands of literature. First, the paper contributes to the literature on the factors that determine the initiation and duration of breastfeeding. For example, Jayachandran and Kuziemko (2011) find that the preference for son impacts the duration of breastfeeding; Chatterji and Frick (2005) show that the timing and intensity of returning to work affect the probability of initiating and the duration of breastfeeding. This paper is the first to show that the nursing mother's working environment, or in particular, whether the employer provides lac-

tation support such as unpaid break time and a special private space, impacts the probability of initiation and duration of breastfeeding.

Second, this paper contributes to the literature on the causal effects of work on breastfeeding. Many researchers have found that more or early return to work is correlated with less breastfeeding, but few have studied the causal impact of work on breastfeeding. Several papers exploit policy changes of increasing the length of maternity leaves, which reduces the nursing mothers' incentive to work and changes their cost-and-benefit calculation before they return to work (Ruhm, 1998; Baker and Milligan, 2008; Rossin, 2011). This paper is the first to study the effect of providing workplace breastfeeding support which increases the nursing mothers' incentive to work and affect their cost-and-benefit calculation after they resume work.

To the best of my knowledge, this type of workplace policies on breastfeeding support is only studied by one case study in the medical literature (Balkam et al., 2011), which evaluated the impact of a workplace lactation program of one large public-sector employer, and found that the workplace service is positively related to the duration of breastfeeding. This case study has several problems. First, the sample size is relatively small, consisting of only 128 women who had used at least one component of the program in the past 3 years. Second, there is selection into the sample, as only those who are still employed in the same organization are surveyed. Third, the author only looked at the impact on the duration of breastfeeding, and did not talk about the initiation of breastfeeding or the labor market outcomes. My paper, however, uses nationally representative data sets, resolves the endogeneity problem by using the plausibly exogenous variation in the timing of the state level

regulation on the provision of the workplace benefits, and studies both the extensive and intensive margins of the feeding and labor market outcomes.

Third, this paper contributes to the theoretical understanding of the mechanism of women's breastfeeding and working decisions. The previous literature tried to model the simultaneous determination of breastfeeding and working, through, such as Roe et al. (1999) using models of simultaneous equations, or Chatterji and Frick (2005) discussing only the theoretical motivation without offering a model. This paper is the first to directly model the interaction of the employee and the employer and how they determine the work contracts and the optimal level of breastfeeding. The model also contributes to the search-match literature, offering a new perspective on how it could be used to study one demographically identifiable group of workers and provide predictions that can be empirically tested.

Finally, this paper is related to the literature using quasi experiments of legal changes to identify the causal effects of labor market policies (Gruber, 1994; Angrist and Evans, 1998; Klerman, 1999; Levine et al., 1999; Waldfogel, 1999; Bailey, 2006; Baker and Milligan, 2008; Rossin, 2011; Blau and Kahn, 2013).

The remaining of the paper proceeds as follows. Section 2 provides background on breastfeeding, the workplace breastfeeding support and the state level mandates. Section 3 presents the model and its predictions. Section 4 discusses the data and the empirical strategy. Section 5 presents the empirical results. Section 6 concludes.

2 Institutional Background

2.1 Background on breastfeeding

The medical literature agrees upon the health benefits of breastfeeding for both the mother and the baby. For mothers, breastfeeding has been linked to decreased postpartum bleeding, earlier return to pre-pregnancy weight, and a reduced risk of breast cancer, type 2 diabetes, and postpartum depression, among other benefits. The potential health benefits for breast milk fed children are extensive: reduced risk of ear, skin, stomach, and respiratory infections; fewer cases of diarrhea; and less sudden infant death syndrome. In the longer term, breast milk fed children have a reduced risk of obesity, type 1 and 2 diabetes, asthma, and childhood leukemia (United States Breastfeeding Committee, 2010; Rothstein, 2013).

The American Academy of Pediatrics (United States Breastfeeding Committee, 2010) recommends exclusive breastfeeding (only breastmilk, without water, formula or solid food) for the first six months of a child's life and then continued breastfeeding through at least the first year. In 2014, the percentage of mothers ever breastfed is 79.2%. The percentage of mothers who are sill breastfeeding at later months decreases quickly: 49.4% at month six, and only 26.7% at month twelve (Centers for Disease Control and Prevention, 2014).

Workplace environment towards breastfeeding is critical in motivating mothers to initiate and continue breastfeeding for the recommended duration. Educational interventions, plus counseling, support and training, may improve the initiation rate and continuation from hospital stay to the first few weeks, as mothers who do not

breastfeed may not know the benefits of breastfeeding, and those who stop early report difficulty with technique or concerns that their child is not getting enough food (Baker and Milligan, 2008). However, the challenges of prolonging breastfeeding duration past the initial weeks appear to come from the work. The need to return to work as the reason for stopping breastfeeding grows in importance starting at about six weeks and emerges as the top reason for stopping at longer durations (Schwartz et al., 2002; Fein and Roe, 1998).

2.2 Background on lactation breaks at the workplace

Having lactation breaks during workdays is critical in insuring continuing breastfeeding. The breastmilk output is determined by the frequency and thoroughness of milk removal. An exclusively breastfed baby (under six months) feeds between 8 and 14 times per 24 hours. If mother and child are separated for more than a few hours, the woman herself must express milk, both to maintain production and to ensure her own health and comfort. Milk left in the breast beyond 3 to 4 hours signals the body to slow its rate of production and decrease the woman's total daily output, which leads mothers to stop breastfeeding and use formula (United States Breastfeeding Committee, 2010).

The increasing proportion of women participating in the labor force after giving birth makes the impact of workplace increasingly relevant in the decision of breastfeeding and whether or when to return to work postpartum. In 2010, 58.8% of infant mothers are in labor force, and the percentage was only 48.9% in 1990 (CPS data).

Providing breastfeeding support at the workplace incur a cost. The cost consists

mainly of the space and the pump. For the cost of space, such as table, chair, sink, storage, etc., the Lactation Friendly Workplace Program of the Minnesota Department of Health and the Texas Department of Health provides an estimate ranging from $145 for minimum accommodation to $525 for maximum accommodation. As for the cost of pumps, employees could use their own manual/electric pumps, or the employer could rent a hospital-grade, heavy-duty multi-user pump, and workers purchase and use individual kits. Table 1 presents the cost estimated for employers using different options of pumps.

There are several mechanisms through which breastfeeding-friendly policies at the workplace may impact breastfeeding. First, working mothers who anticipate that they can breastfeed during work are more likely to begin the process at hospital and may delay or never start using infant formula.

Second, the workplace benefits affect when the mothers return to work; this time factor may affect the duration of breastfeeding. Knowing that they can breastfeed or express milk with relative ease at work, mothers may go back to work earlier. Although early return to work may reduce the mothers' time of direct interaction with the babies, it can have positive economic effect leading to the buying of more efficient pumps (electrical instead of manual, double instead of single). On the other hand, given that the U.S. has no regulation on paid maternity leave and only about half of all working women are eligible for up to 12 weeks' unpaid job-protected leave, mothers may return to work later. An employer's policy on maternity leave may be a more favorable one if the employer also adopts a breastfeeding-friendly policy. Because the marginal cost of breastfeeding increases significantly after the mothers

return to work, the timing of resuming work affects the duration of breastfeeding.

Third, mothers who enjoy breaks at the workplace may engage in more breastfeeding. During the breaks, mothers either directly breastfeed, such as going to nearby childcare centers, arrange for their babies to be brought to their workplace, or express milk for later use. Compared to the mothers who do not have breaks at the workplace and can only breastfeed their babies after work, the mothers who enjoy breaks and a special room for expressing milk are able to provide their baby with larger quantities of breast milk each day.

2.3 Background on breastfeeding benefits mandates

Relatively few studies evaluates the causal effects of work on breastfeeding. The difficulty of this empirical problem relates to the endogeneity problem in the joint decision process of the feeding and working decisions. I exploit a source of plausibly exogenous variation to isolate the effect of a greater incentive of working due to the reduced nursing cost after resuming work on women's feeding and working decisions. This variation arises from the fact that some states at different years passed the regulation requiring employers to provide the workplace lactation support.

Table 2 column (1) lists the years different states passed the "Workplace" law, which summarizes the state laws requiring employers to provide unpaid break time and a special space for expressing breastmilk. Column (2) to (4) summarized three other state level mandates related to breastfeeding. Column (2) is the "Any place" law, which summarizes the state laws that allow women to breastfeed in any public and private place. Column (3) is the "Jury" exemption law, which exempts nursing

women from the jury duties. Column (4) is the "Indecency" exemption law, which allows breastfeeding in public to be exempted from being considered public indecency. The information is summarized according to the website of National Conference of State Legislatures[1], Andrews (2012), and Abdulloeva and Eyler (2013).

Figure 1 shows the years that states passed the law on workplace breastfeeding support. The grey states never passed the law; the darker the blue, the earlier the state passed the law. Texas is the first state to have the workplace breastfeeding law. Inspecting the map, we see that the colors are relatively dispersed, and there exists no clear spatial pattern. It provides a visual evidence suggesting that the passage of the law is relatively random.

The detailed requirements on the breaks and space differ. Some states specified the frequency of the breaks, for example, Oregon requires "unpaid 30-minute breaks during each four-hour shift to breastfeed or pump"; while some states just broadly require a "daily, unpaid break time", as in Georgia. Similarly, requirements on the number of years mothers can enjoy the breaks differ. For example, Colorado allows for up to two years after the child's birth, and Maine up to 3 years following childbirth. Some states do not specify the number of years required. The degree of detailedness about the space vary as well. For example, Illinois requires "a room or other location, other than a toilet stall, where an employee can express her milk in privacy", and Indiana even required the employer to "make reasonable efforts to provide for a refrigerator to keep breast milk that has been expressed".

Some states mentioned in the mandates that discrimination is prohibited. For

[1] http://www.ncsl.org/research/health/breastfeeding-state-laws.aspx, accessed April 2015.

example, Maine stipulates that "The employer may not discriminate against an employee who chooses to express breast milk in the workplace". Still some states allow for exemption. For example, Georgia required that "the employer is not required to provide break time if to do so would unduly disrupt the workplace operations".

As for the enforcement, some state established a specific committee to collect information on possible violation. For example, Rev. Stat. 367-3 requires the Hawaii Civil Rights Commission to collect, assemble and publish data concerning instances of discrimination involving breastfeeding or expressing breast milk in the workplace. Other states specify penalties agains violations. California requires that (a) An employer who violates any provision of this chapter shall be subject to a civil penalty in the amount of one hundred dollars ($100) for each violation; (b) if, upon inspection or investigation, the Labor Commissioner determines that a violation of this chapter has occurred, the Labor Commissioner may issue a citation. Oregon specified that "In addition to any other penalty provided by law, the commissioner may assess a civil penalty not to exceed $1,000 against any person who intentionally violates ORS 653.077 or any rule adopted thereunder".

2.4 The validity and relevance of the law as a natural experiment

The law on workplace lactation support provides an ideal setting to study the causal impact of work on breastfeeding. First, the U.S. has not experienced any change on policies regarding the breastfeeding choice since the 1993 change of the The Fair Labor Standards Act (FLSA). The laws on break time were passed during the late

1990s and the 2000s, providing the opportunity to examine the change in the most recent breastfeeding patterns. Second, only 24 states and the District of Columbia passed the law, and they passed in different years; this difference in timing creates the variation in the degree of exposure to the workplace benefits, allowing us to identify the causal impact.

One concern is that whether a state passes the law is correlated with the level of breastfeeding before the law: states that already have a high or low rate of breastfeeding my pass the law to encourage or to further the growth of breastfeeding. Inspection of the details about the institutional background shows that both directions present. For example, Florida passed law as "an endorsement of the importance of Florida infants being breastfed and protect a mother's right to breastfeed whenever and wherever she needs to", and because "Florida has among the lowest breastfeeding rates in the nation. A perceived major barrier for many women to breastfeeding is a fear of embarrassment in public. This bill would diminish those fears and make women more secure in their right to breastfeed".[2] On the other hand, states like Minnesota passed the law early in 1999, but Minnesota had one of the highest breastfeeding rates in the country.

To use the laws as an exogenous variation to identify the causal impact of workplace breastfeeding benefits on women's feeding and labor market outcomes, whether each passed the regulation or not, and the timing, should not reflect pre-existing differences in state-level characteristics or in the growth rates of the outcome variables of interest. Now, I provide empirical evidence that the initial state-level characteristics

[2] http://www.flbreastfeeding.org/legislation.htm

cannot predict the passage and the time lag of the regulation.

I use the state-level characteristics computed for all 50 states and the District of Columbia from the 1990 IPUMS Census 1% sample. I look at three set of state-level characteristics. Panel A includes the characteristics of the total population of the state, for example, the percentage of state population that live in the central metropolitan area, that are white, in the labor force, employed, receive wage income, receive welfare from the government, receive transfer for the child, and the average firm size. Panel B includes characteristics of the women at child bearing ages of the state. For example, the percentage of women that aged between 15-21, 22-30, and 31-44; the percentage of women at child bearing age that are college graduates, single, in the labor force, employed, or have children. Panel C includes the measures of the ideology score of the state, for example, the ideology score of the Republic party, the Democratic party, the governor, the state institution on the whole, and the citizens. The data on ideology scores comes from Berry et al. (1998). All regressions are weighted by the population.

Table 3 shows that there exist no systematic differences between the states that passed the law and not passed law. The dependent variable is a dummy variable which equals one if the state ever passed the law by 2010. Almost all of the parameters, except for two, are insignificant, suggesting that the passage of the law is plausibly exogenous. It is possible that if more people living in the central metropolitan area, they are more likely to work in large firms instead of farms, where workplace benefits is critical, thus the workers are more likely to push for the passage of the law. Similarly, if more residents are women aged 31-44, the politicians may be more

likely to appeal to their needs and pass the law. Therefore, in the empirical analysis, I include the state fixed effects, state specific linear trends, and test the robustness with the inclusion of census region-by-year fixed effects, to control for the unobserved state level characteristics that do not vary by year, that vary within each state by year linearly, and the unobserved region-specific characteristics that vary by year.

Table 4 demonstrates that state characteristics are not able to predict whether some states passed the law earlier than the other. The dependent variable is a variable that equals the actual year a state passed the law minus 1995, the first year the law is passed. The dependent variable is thus the time lag of the timing of the law. Almost all of the parameters, except for the one before the percentage of population receiving welfare income, are insignificant, offering proof that the timing of the passage of the law is indeed independent with the state level characteristics.

The two tables offer evidence that the issue of selection of the law is not significant among the observed state level characteristics that one could test through regressions. Following Altonji et al. (2005), if the degree of selection on the observed characteristics provides insights about the degree of selection on the unobserved characteristics, it is reasonable to conclude that the state mandates on the workplace breastfeeding benefits seem to be a valid quasi experiment.

Because of the limitation of the data, whether the nursing mother's employer actually provide the benefits or not cannot be directly observed. Table 5 reports the percentage of employers providing various kinds of workplace support at the national level from the Employer Benefits Survey. There is a growing trend of the percentage of employers providing workplace breastfeeding benefits. For example,

the percentage of employers providing workplace lactation rooms increased from 25% in 2009 to 34% in 2013. Therefore, it is more plausible to interpret the empirical results as an "intention to treat" effect rather than a "treatment on the treated" effect (Angrist and Pischke, 2008).

3 Model

To explain the mechanism of the workplace benefits on the feeding and labor market outcomes of the nursing workers, I extend the standard search model as in Pissarides (2000) by introducing firms' provision of workplace breastfeeding benefits, which increases the firms' costs of hiring but reduces workers' opportunity costs of breastfeeding at work.

Assume the worker's instantaneous utility is

$$u = cv(l)d, \tag{1}$$

where c denotes the current consumption, l the hours of leisure per day, and d the hours (intensity) of breastfeeding per day. The length of the day is normalized to unity, with $c > 0$, $0 \leq l \leq 1$, and $0 \leq d \leq 1$. Let $v(l) = l - td$, where parameter $t \geq 0$ measures the disutility of breastfeeding.

Let U and W denote the present-discounted value of the expected income stream of, respectively, an unemployed and an employed worker, including the imputed return from non-market activities.

For an unemployed worker, assume the consumption derived from non-employment

income is normalized to 1. The disutility of breastfeeding under unemployment is zero, or $t = 0$. Thus, the unemployed worker enjoys real return of $(1 - d)d$ from consumption, leisure and breastfeeding, and expects to move into employment with an exogenous probability q.[3] Hence U satisfies the Bellman equation

$$rU = (1 - d)\, d + q\,(W - U)\,, \tag{2}$$

where r is the interest rate.

Let w_j denote the hourly wage of job j, and h_j the number of hours working per day. The policy parameter is α, which denotes the firm's cost of providing the breastfeeding benefits, and is inversely related to the worker's disutility of breastfeeding under employment, or $t = \frac{1}{\alpha}$. Note that, under employment, the disutility is positive, which is always greater than the disutility under unemployment. This assumption is consistent with the previous literature, as pointed out in Roe et al. (1999) and Chatterji and Frick (2005) that the opportunity cost of time spent breastfeeding will rise significantly with the return to work. Assume that $\alpha > 1$, and the larger the benefits, the less costly breastfeeding is at the workplace for an employee relative to that when she is unemployed. Therefore, an employed worker derives utility from consumption $(w_j h_j)$, leisure $(1 - h_j - (1 + \frac{1}{\alpha})d)$ and breastfeeding (d).

Employed workers have an exogenous probability, λ, of losing their jobs and

[3]The probability q could be written as a function of the market tightness, $q(\theta) = q(\frac{v}{u})$, where v is the ratio of the number of vacant jobs to the labor force, and u is the unemployment rate. With the standard definition of the matching technology, the intuition for q is: during a small time interval δt, a vacant job is matched to an unemployed worker with probability $q\delta t$.

become unemployed, thus the valuation placed on them by the market satisfies

$$rW_j = w_j h_j \left[1 - h_j - \left(1 + \frac{1}{\alpha}\right) d\right] d + \lambda \left(U - W_j\right). \tag{3}$$

Now consider the firms' expected returns. Let J_j denote the firm's expected return form the job j, and V the expected return of an unoccupied job. V is then

$$rV = -pc + q \left(J - V\right), \tag{4}$$

where p is the real output of the worker, and c is the search cost. The firm pays a higher search cost for a more productive worker. The firm's expected return of a job is

$$rJ_j = h_j p - w_j h_j - \alpha + \lambda(V - J_j), \tag{5}$$

where α is the cost of providing the breastfeeding benefits at the workplace. The firm enjoys the value of the workers' real product ($h_j p$), and pays the wage ($w_j h_j$) and breastfeeding benefits to the worker (α). If the job remains vacant, the firm does not need to provide the special nursing space or other benefits, thus only when a job match is formed does the firm bear the cost. I assume that the cost is independent of the breastfeeding intensity, and is independent of the worker's productivity. This is a reasonable assumption, as the cost of providing the private nursing rooms could be treated as a fixed cost determined by the operation/property costs, rather than who uses the room or how often the workers choose to use that room. λ is the

exogenous probability that the job match is lost, due to a negative shock on workers' productivity or on the firm such that the job is no longer profitable for the firm.

At each period, the worker and the employer perform a Nash Bargain and determine the optimal wage w_j and working hours h_j, given a fixed bargaining strength β, and $0 < \beta < 1$. The bargain solves

$$\max_{w_j, h_j} (W_j - U)^{\beta} (J_j - V)^{1-\beta}$$

$$s.t.$$

$$(2) - (5).$$

The β may be interpreted as a relative measure of labor's bargaining strength. The workers then solve for the optimal hours of breastfeeding when unemployed and employed, respectively, given the equilibrium wage and hours working.

The model gives rise to the following testable hypotheses. Appendix A provides detailed solution to the model and proof of propositions.

Proposition 1. *With the workplace breastfeeding benefits, the employed worker breastfeed more per day.*

This result is intuitive, as the workers have a reduced cost of breastfeeding under employment when firms provide these benefits, the optimal level of breastfeeding increases.

Proposition 2. *With the workplace breastfeeding benefits, workers work for longer hours per day.*

Proposition 3. *With the workplace breastfeeding benefits, workers receive a higher hourly wage.*

It is interesting that both hours working and hourly wage increase with α. The intuition is that to compensate for the higher cost, firms demand for more hours working, however, the workers accordingly demand for a higher hourly wage to compensate for the loss of leisure. In equilibrium, the worker's real product is always greater than the hourly wage, so the firm is willing to give up a bit rent through the hourly wage. The worker and the firm share the increased real product as workers work for longer hours.

Proposition 4. *The effects of the workplace breastfeeding benefits are heterogenous along productivity. For a more productive worker, the hours of breastfeeding under employment increase more, the working hours increase less, and the hourly wage increases more, than that for a less productive worker.*

Why does the heterogenous effects along the productivity on the working hours differ from that on the breastfeeding hours and hourly wage? The reason is that the workplace benefits work through two channels. On the one hand, the benefits reduce the shadow price of breastfeeding, allowing for longer breastfeeding hours and working hours. These effects depend on the productivity, as the firm's revenue is directly linked to the hours working and the worker's productivity. On the other hand, the firm pays a cost to provide the benefits, but this cost is independent of the productivity. The cost of the benefits can be thought as being diluted over the worker's productivity. For the more productive worker, increasing the working

hours a little bit is enough to compensate for the increased cost, but for the less productive workers, she would have to work a lot more in order to compensate for the benefits' cost. Therefore, with the benefits, all workers work longer hours, but the less productive workers would need to work for even longer hours.

4 Data and Empirical Strategy

4.1 Data

For breastfeeding outcomes, I use the National Immunization Survey (NIS), 2003-2012. The NIS is conducted jointly by National Center for Immunizations and Respiratory Diseases, the National Center for Health Statistics and Centers for Disease Control and Prevention. The NIS began collecting information on breastfeeding behavior since 2003. The data has no information on the year of birth, but reports the year of survey and the baby's age in three categories: 19-23 months, 24-29 months, and 30-35 months. I first reduce the survey year of the babies in these three age categories by 1.75 (=(19+23)/24), 2.21 (=(24+29)/24), and 2.71 (=(30+35)/24) respectively, then round up or down the numbers to find out the actual years of birth. The deduced years of birth range from 2001-2010.

Table 6 provides the summary statistics for the NIS data. The sample for first two columns consists of the babies born in states that never passed the law on workplace breastfeeding. The sample for columns 3 and 4 consists of babies born in the states that have ever passed the law. The next four columns further break down this sample: columns 5 and 6 include the babies born in the years that the law has

not been enacted, and columns 7 and 8 include the babies born in the years under the law.

For the labor market outcomes, I use the March Current Population Survey (CPS), 1990-2010, downloaded from the IPUMS. The sample of interest is the female and male at child bearing ages, or aged between 18-44. Because the infant mothers' labor market outcomes depend significantly upon the marital status, or the partner's characteristics, thus for the married individuals, I merge into the sample their partner's characteristics, including age, levels of education, race, and labor force participation status.

Table 7 provides the summary statistics for the CPS data. The upper panel presents the individual level characteristics, and the lower panel presents the spouse characteristics only for those whose spouse' information is included in the CPS as well. The sample for first two columns consists of the women with the youngest child being less than one year old, living in the state-year cell without the law of workplace lactation support. The sample for columns 3 and 4 consists of the women with the youngest child being less than one year old, living in state-year cells under the law on workplace breastfeeding. The samples for columns 5-6 and 7-8 are similarly defined for the male workers.

4.2 Empirical Strategy

For the breastfeeding data, the main specification uses a difference-in-differences, or DD framework:

$$y_{ist} = \alpha + \beta WP_{st} + X_{ist}^{'}\Gamma + \theta_s + \theta_t + \theta_s \cdot t + \epsilon_{ist}, \tag{6}$$

where the outcome variable is one of the following variables: $EverBf_{ist}$, a dummy variable which equals one if the mother ever breastfeed; $log(WksBf_{ist})$, the log of number of weeks the mother breastfeed, and the weeks of breastfeeding is right censored at 104 weeks. I use a Probit model for the impact on $EverBf_{ist}$ and a Tobit model for the impact on $log(WksBf_{ist})$.

WP_{st} is a dummy variable which equals one if the state s has passed regulation requiring employers to provide the workplace breastfeeding benefits in year t. The parameter β is the parameter of interest, which can be interpreted as the causal impact of providing workplace breastfeeding benefits on the outcome variables. X_{ist} is a vector of individual covariates, which includes the baby's sex, race categories (hispanic, black, other, and white is the omitted category), a dummy variable which equals one if the child ever receives benefits from the WIC (the Women, Infant, and Child program), a dummy variable which equals one if the baby is a first born, age categories of the mom (less than 19 years old, greater than 30 years old, and the omitted category is aged between 19-30), levels of the mother's education (high school dropout, high school graduates, and some college, with the college graduates as the omitted category), a dummy variable which equals one if the mother is married, the

number of kids in the household, and the ratio of household income to the poverty line. θ_s and θ_t are state and time fixed effects, respectively. $\theta_s \cdot t$ is a state specific linear time trend. ϵ_{ist} is a random error term.

To test for the existence of a pre-trend, i.e. whether the effects started before the actual enactment of the law, I also include a pre-trend term, lag_{st}, a dummy variable which equals 1 if the state s at year $t+1$ has the law.

A threat to the identification might be that the passage of the workplace lactation support is endogenous, or states that pro-breastfeeding already may pass the law on the workplace lactation support. To further control for the attitude or cultural towards breastfeeding at the state level, I include three controls variables capturing whether the state have three other types of law on breastfeeding. The first type of law is $AnyPlace_{st}$, which equals one if the state s at year t has passed regulation allowing nursing mothers to breastfeed in any public and private space. The second type is $Jury_{st}$, which equals one if the state s at year t has passed regulation exempting nursing mothers from jury duty. The last type is $Indecency_{st}$, which equals one if the state s at year t has passed regulation exempting breastfeeding in the public from being considered as public indecency.

For the labor market outcomes, the main specification uses a difference-in-differences-in-differences, or a DDD specification:

$$y_{ist} = \alpha + \beta_1 WP_{st} + \beta_2 Mom_{ist} + \beta_3 WP_{st} \times Mom_{ist} + X_{ist}^{'}\Gamma + \theta_s + \theta_t + \epsilon_{ist}. \quad (7)$$

The outcome variable is one of the following variables: lfp_{ist}, a dummy variable which equals one if individual is currently in labor force; emp_{ist}, a dummy variable

which equals one if conditional on in the labor force, the individual is currently employed; $atwork_{ist}$, a dummy variable which equals one if conditional on being employed, the individual is working in the reference week; $log(Hourswork_{ist})$, the log weekly working hours if the individual works in the reference week; $parttime_{ist}$, a dummy variable which equals one if the individual worked less than 35 hours during the reference week; $log(Hourlywage_{ist})$, the log real hourly wage of the individual in the reference week.

Mom_{ist} is a dummy variable which equals one if the individual is a mother of an infant, or her youngest child is less than one year old, and equals zero if the individual is a male. The parameter before the interaction term, β_3, is the parameter of interest. X_{ist} is a vector of individual characteristics, which includes age, age squared, a dummy variable for non white, marital status, female, an interaction term between female and marital status, levels of education (high school graduates, some college, and college graduates, with the as the omitted category, and dummies for industry. θ_s and θ_t are state and year fixed effects, respectively. ϵ_{ist} is a random error term. The standard errors are clustered at the state level.

Because the marginal effects of interaction terms in non-linear models are difficult to interpret, thus in the DDD specification, OLS models are used. To control for the culture and attitude towards breastfeeding at the state level, in other specifications, I also include the three other law dummies, and the interaction terms between each law and the Mom_{ist} variable. To control for the state specific trend, I also include a linear state specific time trends in alternative specifications.

5 Main Results

5.1 Results on breastfeeding

Table 8 provides results on the breastfeeding outcomes. Panel A shows the results for the extensive margin, or the marginal effect on the probability that the mother ever breastfeed. Column 1 shows the results for the main specification, equation (6). Column 2 adds the pre-trend term, which is a dummy variable that equals one for each state one year ahead of the actual year that passed the law. After controlling for the pre-trend, the parameter of interest is of the same magnitude, but the standard error becomes larger. Column 3 adds the three dummy variables indicating whether the state has three other types of policies related to breastfeeding. The parameter of interest is still statistically significant at 1%, and the magnitude is even larger, after controlling for the culture on breastfeeding at each state in different years. The impact on the extensive margin is about 1 percentage point. Column 4 adds the region by year fixed effects, to further control for the unobserved factors that affect the states in the same region in each year. The parameter of interest is a little bit smaller, and is still statistically signifiant at 1%. To sum up, the impact on the decision of ever starting breastfeeding is about 0.8 percentage points, and is robust and highly statistically significant.

Table 8 Panel B provides results on the intensive margin of breastfeeding outcomes, or the log of the number of weeks the baby is breastfed. The parameter of interest in Column 1 is positive and statistically significant at 1%. Because the model is a Tobit regression, the estimated effect is on the latent variable, or the uncensored

duration of breastfeeding. The interpretation is that providing the workplace benefits increases the number of weeks of breastfeeding by about 5.5%, or 1 week. The parameters of interest in the other columns are still positive and of similar magnitudes, but lose significance as the standard errors become much larger. To sum up, the workplace benefits increase on the uncensored duration of breastfeeding, but the effect is not significant.

5.2 Results on labor outcomes

Table 9 provides results on the extensive margin of the labor market outcomes. Column 1 shows the results using equation (7) for the entire sample. Column 2 shows the results using the same specification for the sample of singles. Column 3 shows the results using the same specification for the sample of married individuals. Column 4 shows the results for the sample of married individuals, with the additional control of the vector of spouse characteristics.

Table 9 Panel A shows the results on the probability of being in the labor force. In Column 1, the estimated parameter before the interaction term, is 0.01 and is statistically significant at 1% level, suggesting that after the employer provides the workplace benefits, the probability that an infant mother is in the labor force increased by 1.1 percentage points. The increase is about 1.4 percentage points for the sample of single mother, and the increase is about 1.4 percentage points for the married mother. The estimates in Column 3 and 4 are very similar, suggesting that the effect is not correlated with the characteristics of the spouse much.

Table 9 Panel B shows the results on the probability of being employed, condi-

tional on being in the labor force. In all four columns, the estimated parameters are negative, very small and statistically insignificant. The interpretation is that the workplace law does not significantly affect the probability of finding jobs conditional on the nursing mothers participate in the labor force.

Table 9 Panel C shows that the results on the probability of working in the reference week, conditional on having a job. Similar to the impact on employment rate, in all four columns, the estimated parameters are negative, very small and statistically insignificant. The interpretation is that the workplace law does not significantly affect the probability of returning to work, or the length of maternity leaves, conditional on the infant mother is employed.

Table 10 provided results on the intensive margin of the labor market outcomes. Again, Column 1 shows the results using equation (7) for the entire sample. Column 2 shows the results using the same specification for the sample of singles. Column 3 shows the results using the same specification for the sample of married individuals. Column 4 shows the results for the sample of married individuals, with the additional control of the vector of spouse characteristics.

Table 10 Panel A shows the results on the log of working hours per week. In Column 1, the estimated parameter before the interaction term, is 0.0332 and is statistically significant at 1% level, suggesting that after the employer provides the workplace benefits, the working hours per week increased by about 3.32%. The estimate in Column 2 is negative, very small and statistically insignificant, suggesting that the law does not significantly affect the working hours of the single mothers. For the married mothers, the workplace benefits increase the working hours by about

5.2%; whether the spouse characteristics are included does not affect the results significantly. Given that the mean of the dependent variable for the married sample is 3.728, or about 41.6 hours per week, the workplace benefits increase the working hours by about 2.1 hours, or 127 minutes per week, or 25 minutes per day. Given the fact that the lactation break time is unpaid, and each break usually takes about 20 minutes, it seems that infant mothers do not over work to compensate for the break, or part of the break time is actually paid for.

To disentangle the effect on the increase of hours working per week, one wish to know do more mothers work full time, or dimply do mothers work for longer hours. Table 10 Panel B shows the results on the probability of being employed part-time, conditional on being employed. In all four columns, the estimated parameters are negative and statistically significant. The effect is larger for the married sample. The interpretation is that the workplace law increases the working hours per week, through increasing the proportion of mothers that are employed full time.

Table 10 Panel C shows the results on the log of hourly wage. In Column 1, the estimated parameter before the interaction term, is 0.038 and is statistically significant at 1% level, suggesting that after the employer provides the workplace benefits, the hourly wage increased by about 3.8%. The estimate in Column 2 is positive, thought statistically insignificant, suggesting that the law does not significantly affect the hourly wage of the single mothers, consistent with the findings on the hours working. For the married mothers, the workplace benefits increase the hourly wage by about 3.8%; whether the spouse characteristics are included does not affect the results significantly.

Summarizing the impact on the intensive margin, it is reasonable to find that the workplace benefits affect the married sample more than the single sample. A possible explanation is that the married mothers have a higher reservation wage, or a higher non-employment income, as their partner is usually the bread earner and the married individual have a higher level of productivity measured as the level of education. The married mothers have more freedom in working for longer hours and are more likely to receive a higher wage due to the higher firm-specific human capital.

5.3 Robustness

Table 11 to 13 provided robustness checks on the outcomes that the workplace benefits have a signifiant effect. As most of the effect comes from the married sample, the robustness checks are performed on the married sample only, and all specifications include the spouse characteristics as additional controls. Column 1 shows the results using equation (7) with the additional spouse characteristics, and serves as the benchmark. Column 2 re-estimate it without weights. Column 3 adds additional state level characteristics that vary by year, including the annual unemployment rate,and the growth rate of real GDP, to control for the macro economic situation. Column 4 adds the state specific linear time trends. Column 5 adds the region-by-year fixed effects. Column 6 adds the dummies for the three other policies related to breastfeeding, as well as their interaction with the Mom_{ist} dummy.

In Table 11, the estimates of interest in almost all columns are positive and significant, except for the last column, when we include the interaction term with the other three breastfeeding laws. Interestingly, the parameters before all three other

interaction terms are positive and significant. This likely suggests that though the impact on the labor force participation might not come from the workplace benefits, the legal environment towards breastfeeding in each state does indeed positively affect the labor force participation rate of infant mothers.

In Table 12, the estimates of interest in all columns are positive, significant, and similar to each other. This reflects that the workplace benefits significantly and robustly increase the hours working of infant mothers.

In Table 13, the estimates of interest in all columns are positive, though the estimates in Column 2 and 6 are no longer significant. In Column 6, the parameter before the interaction term of the "any place" law and infant mother is positive and statistically significant, and its magnitude is similar to the magnitude of the parameter before the workplace law in the benchmark case. The reason could be that the passage of the workplace benefits correlated with the passage of the "any place" law, which captures the impact on the hourly wage.

6 Conclusion

This paper finds that having access to workplace breastfeeding benefits increases the probability of initiating breastfeeding and the duration of breastfeeding; it increases the infant mothers' probability of participating in the labor force, the hours working per week, and the hourly wage.

That the paper finds that workplace lactation support is effective in promoting breastfeeding in both the extensive and the intensive margin, and that the policy

intended for the promotion of breastfeeding also improves women's labor market outcomes, have important policy implications. In 2010, the Patient Protection and Affordable Care Act (ACA) Section 420 required employers with 50 or more employees to provide reasonable break time and a private, non-bathroom space for nursing mothers to express breast milk during the workday for up to one year after the child's birth. The new requirements became effective when the ACA was signed into law on March 23, 2010. With more recent data, we can use the states that have passed state mandates on workplace benefits as control states, and the other as treated states, to further estimate the impact.

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A Proof of Propositions

The problem is solved backward. First, an unemployed worker solves

$$\max_d (1-d)\, d$$

and the optimal hours of breastfeeding is $d^U = .5$. An employed worker, given w_j and h_j, solves

$$\max_d w_j h_j \left(1 - h_j - \left(1 + \frac{1}{\alpha}\right) d\right) d$$

and

$$d^W = \frac{1-h_j}{2\,(1+\alpha)}.$$

Second, substitute the d in (2) for d^U and those in (3) and (5) for d^W, and the three equations become:

$$rU = \frac{1}{4} + q\,(W_j - U)\,, \tag{8}$$

$$rW_j = w_j h_j \frac{(1-h_j)^2}{4\left(1+\frac{1}{\alpha}\right)} + \lambda\,(U - W_j)\,, \tag{9}$$

$$rJ_j = h_j(p - w_j) - \alpha + \lambda(V - \lambda J_j). \tag{10}$$

Then solve the Nash Bargain problem. To simplify the calculation, assume $\beta = \frac{1}{2}$, i.e., the worker and the employer are symmetric in their bargaining power. Because this paper does not model the comparative statics with respect to the bargaining strength, this simplification would not affect the results. The first order conditions are

$$(w) : \frac{(1-h)^2}{4(1+\frac{1}{\alpha})}(J - V) - (W - U) = 0, \tag{11}$$

and

$$(h) : \frac{w(1-h)(1-3h)}{4(1+\frac{1}{\alpha})}(J - V) + (W - U)(p - w) = 0. \tag{12}$$

Note that I consider the symmetric Nash equilibrium outcome, therefore in equilibrium, I could drop the subscript j. Because in equilibrium, $V = 0$, from equation (4),

$$J = \frac{pc}{q}. \tag{13}$$

The value of the job increases in the search cost, and decreases in the probability that a job match is formed.

From (10) and (13),

$$h(p-w)-\alpha-(r+\lambda)\frac{pc}{q}=0. \tag{14}$$

Condition (14) shows that in equilibrium the real product is larger than the wage ($p > w$), because the firms bear the cost of breastfeeding benefits (the second component) and it is costly to search for a new worker (the third component).

From (8) and (9)

$$U-W=\frac{1}{r+q+\lambda}\left[\frac{1}{4}-wh\frac{(1-h)^2}{4(1+\frac{1}{\alpha})}\right] \tag{15}$$

In a Nash bargain, the "dissolution payoff" for the worker (U) must be strictly worse than the payoff under employment (W), thus a sufficient condition for the solution is

$$1+\frac{1}{\alpha}<wh(1-h)^2 \tag{16}$$

or the instantaneous utility from employment is strictly larger than that from unemployment, or the benefits of the breastfeeding is larger than minute and cannot be too small.

Substituting $V=0$, J from (13), $(r+\lambda)$ from (14), and $(U-W)$ from (15) into (11), the wage equation is

$$wh-\frac{1+\frac{1}{\alpha}}{(1-h)^2}-(pc+p\,(h-w)-\alpha)=0. \tag{17}$$

From (11) and (12),

$$wh-\frac{p}{2}(1-h)=0. \tag{18}$$

Then solve for the equilibrium w^* and h^* from (17) and (18), and then determine d^{W*} as well. Then derive the testable predictions and comparative statics.

Proof. for Proposition 1: From (17) and (18),

$$2wh=p(1-h)=\frac{1+\frac{1}{\alpha}}{(1-h)^2}+p(h+c)-\alpha. \tag{19}$$

Then, define

$$F(h) \equiv \frac{1+\frac{1}{\alpha}}{(1-h)^2} + 2ph - p + pc - \alpha = 0. \tag{20}$$

By Implicit Function Theorem, the effect of the workplace benefits on the hours of work is then

$$\frac{\partial h^*}{\partial \alpha} = -\frac{\frac{\partial F}{\partial \alpha}}{\frac{\partial F}{\partial h^*}} = -\frac{-\frac{\alpha^{-2}}{(1-h)^2} - 1}{2(1+\frac{1}{\alpha})\frac{1}{(1-h)^3} + 2p} = -\frac{-}{+} > 0.$$

□

Proof. for Proposition 2: Express h in terms of w,

$$h = \frac{p}{2w+p},$$

and plug into (20),

$$G(w) \equiv (1+\alpha)(1+\frac{p}{2w})^2 + \frac{2p^2}{2w+p} - p + pc - \alpha = 0.$$

By Implicit Function Theorem, the effect of the workplace benefits on the hourly wage is

$$\frac{\partial w^*}{\partial \alpha} = -\frac{\frac{\partial G}{\partial \alpha}}{\frac{\partial G}{\partial w^*}} = -\frac{(1+\frac{p}{2w})^2 - 1}{-(1+\alpha)(1+\frac{p}{2w})\frac{p}{w^2} - \frac{4p^2}{(2w+p)^2}} = -\frac{+}{-} > 0.$$

□

Proof. for Proposition 3: Express h in terms of d^W,

$$h = 1 - 2d^W(1+\frac{1}{\alpha})$$

and plug into (20),

$$H(d^W) \equiv \frac{1}{4(1+\frac{1}{\alpha})d^{W2}} + p - \alpha + pc - 4pd^W(1+\frac{1}{\alpha}) = 0.$$

The effect of the workplace benefits on the hours of breastfeeding is

$$\frac{\partial d^{W*}}{\partial \alpha} = -\frac{\frac{\partial H}{\partial \alpha}}{\frac{\partial H}{\partial d^{W*}}} = -\frac{\frac{1}{4d^{W2}(1+\frac{1}{\alpha})^2\alpha^2} - 1 + 4pd^W\alpha^{-2}}{-\frac{1}{2(1+\alpha)d^{W3}} - 4p(1+\frac{1}{\alpha})}$$

$$= -\frac{(\frac{1}{2d^W(1+\frac{1}{\alpha})\alpha} - 1)(\frac{1}{2d^W(1+\frac{1}{\alpha})\alpha} + 1) + 4pd^W\alpha^{-2}}{-\frac{1}{(1+\alpha)d^{W3}} - 4p(1+\frac{1}{\alpha})}$$

$$= -\frac{(\frac{1}{2d^W(1+\alpha)} - 1)(\frac{1}{2d^W(1+\alpha)} + 1) + 4pd^W\alpha^{-2}}{-\frac{1}{(1+\alpha)d^{W3}} - 4p(1+\frac{1}{\alpha})}$$

$$= -\frac{+}{-} > 0,$$

if

$$d^W(1+\alpha) < \frac{1}{2},$$

i.e., the hours of breastfeeding underemployment is less than half of the day, which makes sense. As the rest of the hours are spent among working and leisure (including "productive" leisure time such as hours of sleep), and it is reasonable to assume that these activities take longer than 12 hours. Therefore, the workplace benefits increase the hours of breastfeeding under employment. □

Proof. for Proposition 4: Calculate the following cross derivatives:

$$\frac{\partial^2 h^*}{\partial \alpha \partial p} = \frac{\partial\left(-\frac{-\frac{\alpha^{-2}}{(1-h)^2}-1}{2(1+\frac{1}{\alpha})\frac{1}{(1-h)^3}+2p}\right)}{\partial p} < 0,$$

as p only appears in the denominator. Thus the effects of more breastfeeding benefits at the workplace increase the hours work more among the less productive workers.

$$\frac{\partial^2 w^*}{\partial \alpha \partial p} = \frac{\partial\left(\frac{(1+\frac{p}{2w})^2-1}{(1+\alpha)(1+\frac{p}{2w})\frac{p}{w^2}+\frac{4p^2}{(2w+p)^2}}\right)}{\partial p} \equiv \frac{\partial(A/B)}{\partial p}$$

$$\frac{\partial^2 w^*}{\partial \alpha \partial p} = \frac{2(1+\frac{p}{2w})\frac{1}{2w}B - A\left[(1+\alpha)\frac{p}{2}(-w^{-2})\frac{p}{w^2} + (1+\alpha)(1+\frac{p}{2w})p(-w^{-3}) + 4p^2(-2)2(2w+p)^{-3}\right]}{B^2}$$

$$\frac{\partial^2 w^*}{\partial\alpha\partial p} = \frac{(+) - [-]}{+} > 0$$

Thus the effects of more breastfeeding benefits at the workplace increase the hourly wage to a larger extent among the more productive workers.

$$\frac{\partial^2 d^{W*}}{\partial\alpha\partial p} = \frac{\partial\left(\frac{4pd^W\alpha^{-2}}{\frac{1}{(1+\alpha)d^{W3}}+4p(1+\frac{1}{\alpha})}\right)}{\partial p} \equiv \frac{\partial(C/D)}{\partial p}$$

$$= \frac{4d^W\alpha^{-2}\frac{1}{(1+\alpha)d^{W3}}}{D^2} > 0$$

Thus the effects of more breastfeeding benefits at the workplace increase the hours of breastfeeding under employment to a larger extent among the more productive workers.

□

B Figures and Tables

Table 1: Estimated Annual Cost of Providing Pumps

Option	Pump costs	Attachment Kit Costs	Total Annual Cost
Purchase a multi-user hospital-grade pump	\$1.125 (one time expense)	\$ 850 per year (\$ 42.5 × 20 kits)	\$ 1979 first year cost (\$ 850 per year thereafter)
Rent a multi-user hospital grade pump	\$ 780 per year (\$ 65 ×12 months)	\$ 850 per year (\$ 42.5 × 20 kits)	\$ 1630 per year
Single user portable electric breast pumps	\$ 5000 per year (\$ 250 × 20)	\$ 0 (attachments kits are included)	\$ 5000 per year

Notes: Costs are figured as a general average. Actual prices could be more or less, depending on the types of pumps selected and the company from which they are acquired. Source: Easy Steps to Support Breastfeeding Employees, published in 2008 by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Meternal and Child Health Bureau.

Table 2: Years of State Laws on Breastfeeding

State Name	(1) Workplace	(2) Any Place	(3) Jury	(4) Indecency
ALABAMA		2006		
ALASKA		1998		
ARIZONA		2006		2005
ARKANSAS	2009	2007		2007
CALIFORNIA	2001	1997	2000	
COLORADO	2008	2004		
CONNECTICUT	2001	1997	2012*	
DELAWARE		1997		
DISTRICT OF COLUMBIA	2007	2007		2007
FLORIDA		1993		1993
GEORGIA	1999	1999		
HAWAII	1999	2000		
IDAHO			2002	
ILLINOIS	2001	2004	2006	1995
INDIANA	2008	2003		
IOWA		2002	1994	
KANSAS		2006	2006	
KENTUCKY		2006	2007	
LOUISIANA		2001		
MAINE	2009	2001		
MARYLAND		2003		
MASSACHUSETTS		2008		2008
MICHIGAN			2012*	1994
MINNESOTA	1998	1998	1998	1998
MISSISSIPPI	2006	2006	2006	2006
MISSOURI		1999	2014*	1999
MONTANA	2007	1999	2009	1999

NEBRASKA		2011*	2003	
NEVADA		1995		1995
NEW HAMPSHIRE				1999
NEW JERSEY		1997		
NEW MEXICO	2007	1999		
NEW YORK	2007	1994		2002
NORTH CAROLINA		1993		1993
NORTH DAKOTA	2009	2009		2009
OHIO		2005		
OKLAHOMA	2006	2004	2004	2004
OREGON	2007	1999	1999	
PENNSYLVANIA		2007		2007
RHODE ISLAND	2003	2008		1998
SOUTH CAROLINA		2005		2005
SOUTH DAKOTA			2012	2002
TENNESSEE	1999	2006		2006
TEXAS	1995	1995		
UTAH	2012*	1995		1995
VERMONT	2008	2002		
VIRGINIA	2002	2002	2005	1994
WASHINGTON	2001	2009		2001
WEST VIRGINIA		2014*		
WISCONSIN		2009		1995
WYOMING	2003	2007		2007

Notes: * denotes years later than 2010, and these states are considered without the law in this paper's data sample.

Figure 1: The Years of Passage of State Laws on Workplace Lactation Support

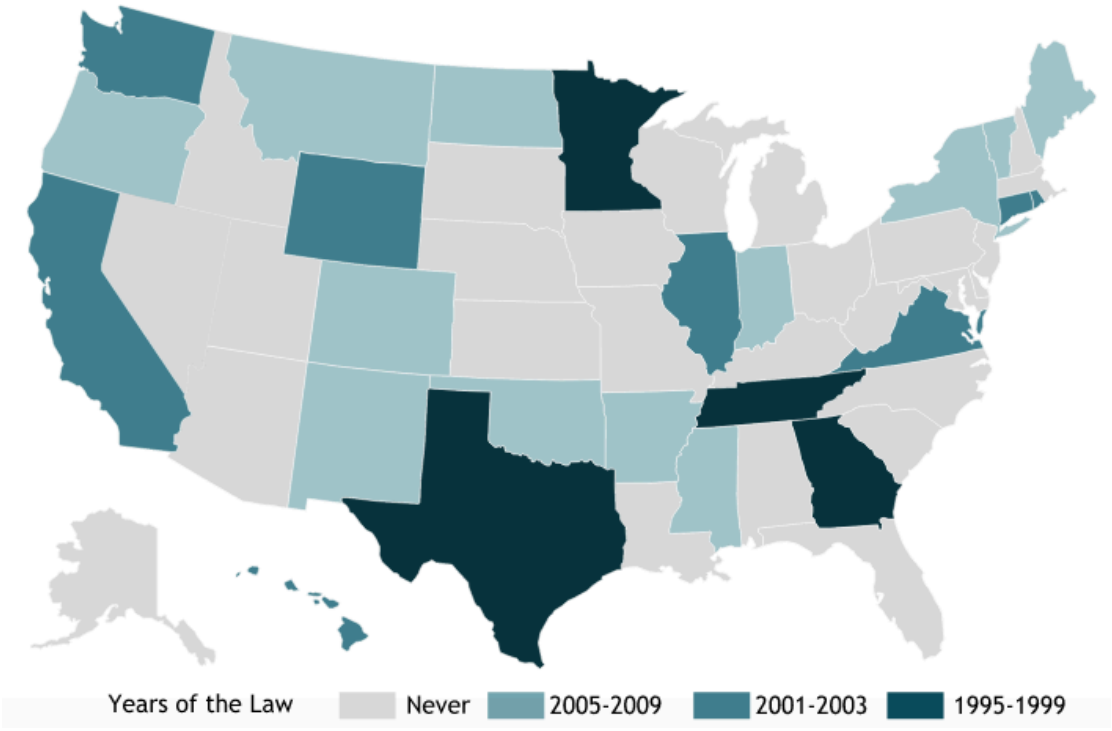

Table 3: 1990 State-level Prediction of the Passage of the Law

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. % Population								
	central metro	white	lfp	emp	inc wage	inc welfr	inc child	firm size
Point Est.	1.485***	-0.835	-1.288	-1.913	2.39e-05	0.00240	-0.00385	-0.372
S.e	(0.547)	(0.683)	(2.325)	(2.343)	(4.07e-05)	(0.00198)	(0.00582)	(0.327)
R-squared	0.143	0.020	0.008	0.018	0.009	0.061	0.011	0.040
B. % Women								
	age 15-21	age 22-30	age 31-44	college	single	lfp	emp	mother
Point Est.	9.510	3.490	7.608**	3.915	2.394	-1.458	-1.458	-0.00158
S.e	(8.461)	(5.390)	(3.517)	(2.607)	(2.586)	(1.884)	(1.884)	(3.818)
R-squared	0.043	0.012	0.068	0.069	0.025	0.017	0.017	0.000
C. Ideology score								
	rep party	dem party	governor	institution	citizen			
Point Est.	0.00517	0.0168	0.00348	0.00473	0.00457			
S.e	(0.00888)	(0.0113)	(0.00390)	(0.00371)	(0.00563)			
R-squared	0.007	0.044	0.017	0.033	0.014			

Notes: The dependent variable is a dummy if the state ever passed the law by 2010. The no. of observation is 51 in panel A and B, and 50 in panel C (D.C. is excluded). All regressions are weighted by the population weights. Source: 1990 CPS. Berry et al (1998).

Table 4: 1990 State-level Prediction of the Lag of the Passage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. % Population	central metro	white	lfp	emp	inc wage	inc welfr	inc child	firm size
Point Est.	7.506	-1.239	-14.69	-19.72	0.000157	0.0279*	0.0197	-3.432
S.e	(7.670)	(6.876)	(23.85)	(23.01)	(0.000370)	(0.0159)	(0.0484)	(2.828)
R-squared	0.040	0.000	0.011	0.020	0.004	0.091	0.003	0.037
B. % Women	age 15-21	age 22-30	age 31-44	college	single	lfp	emp	mother
Point Est.	-22.23	2.892	36.49	37.90	19.41	-10.82	-10.82	2.268
S.e	(83.00)	(43.96)	(40.53)	(26.05)	(28.25)	(18.38)	(18.38)	(28.20)
R-squared	0.003	0.000	0.017	0.071	0.018	0.010	0.010	0.000
C. Ideology score	rep party	dem party	governor	institution	citizen			
Point Est.	0.0867	0.151	0.0316	0.0146	0.0358			
S.e	(0.108)	(0.111)	(0.0438)	(0.0489)	(0.0572)			
R-squared	0.016	0.029	0.011	0.003	0.007			

Notes: The dependent variable equals the year of passage minus 1995, i.e. the lag from the first state that passed the law. The no. of observation is 51 in panel A and B, and 50 in panel C (D.C. is excluded). All regressions are weighted by the population weights. Source: 1990 CPS. Berry et al (1998).

Table 5: Percentage of Employers with Maternal Benefits program

	2009	2010	2011	2012	2013
On-site lactation/mother's room	25	28	28	30	34
Bring child to work in emergency	29	30	33	32	26
Lactation support services	5	4	5	6	8
Break arrangements*	43	43	45	43	39

Source: Employer Benefits Survey, 2009-2013.
Notes: * Provides employees more flexibility over when they take breaks (breaks in general, not breastfeeding breaks).

Table 6: Summary statistics: The National Immunization Survey, 2003-2012

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Never		Ever		Ever: b/f law		Ever: a/t law	
VARIABLES	mean	sd	mean	sd	mean	sd	mean	sd
Ever breastfeed	0.726	0.446	0.778	0.416	0.764	0.425	0.781	0.413
Log wks breastfeed*	2.955	1.177	3.054	1.123	3.018	1.169	3.062	1.112
Year of Birth	2,005	2.632	2,005	2.596	2,003	1.781	2,005	2.545
Male Child	0.513	0.500	0.512	0.500	0.514	0.500	0.512	0.500
High School Dropouts	0.0986	0.298	0.115	0.319	0.0903	0.287	0.121	0.326
High School Graduates	0.219	0.413	0.202	0.402	0.231	0.421	0.195	0.396
Some College	0.242	0.428	0.235	0.424	0.232	0.422	0.236	0.425
College Graduates	0.441	0.497	0.448	0.497	0.447	0.497	0.448	0.497
Married	0.736	0.441	0.753	0.431	0.775	0.417	0.747	0.435
Hispanic	0.135	0.342	0.232	0.422	0.144	0.351	0.254	0.435
White	0.635	0.481	0.563	0.496	0.695	0.460	0.529	0.499
Black	0.148	0.355	0.102	0.303	0.0863	0.281	0.106	0.308
Other race	0.0815	0.274	0.103	0.304	0.0744	0.262	0.110	0.313
Firstborn	0.433	0.495	0.436	0.496	0.426	0.495	0.439	0.496
Income poverty ratio	2.144	0.955	2.105	0.975	2.122	0.925	2.101	0.988
Child Ever Received WIC	0.418	0.493	0.433	0.495	0.420	0.494	0.436	0.496
Child Receiving WIC	0.238	0.426	0.256	0.436	0.232	0.422	0.262	0.440
Mother Age<=19	0.0193	0.137	0.0192	0.137	0.0188	0.136	0.0193	0.137
19 <Mother Age <30	0.360	0.480	0.347	0.476	0.395	0.489	0.335	0.472
Mother Age>=30	0.620	0.485	0.634	0.482	0.586	0.493	0.646	0.478
# kids in hh	1.889	0.610	1.888	0.610	1.888	0.617	1.888	0.608
Workplace law	0	0	0.797	0.402	0	0	1	0
N	89418		103,568		20975		82,593	

NOTES: * The number of observation is different as the variable is defined conditional on the mother ever breastfeed.

Table 7: Summary statistics: The Current Population Survey, 1990-2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mom, no law		Mom, law		Male, no law		Male, law	
VARIABLES	mean	sd	mean	sd	mean	sd	mean	sd
Age	30.60	5.761	31.06	5.900	31.60	7.807	31.50	7.923
Female	1	0	1	0	0	0	0	0
Married	0.860	0.347	0.855	0.352	0.603	0.489	0.572	0.495
Nonwhite	0.170	0.376	0.208	0.406	0.153	0.360	0.216	0.411
High school grads	0.271	0.445	0.260	0.439	0.300	0.458	0.299	0.458
Some college	0.284	0.451	0.276	0.447	0.270	0.444	0.280	0.449
College grads	0.241	0.428	0.295	0.456	0.207	0.405	0.233	0.423
In labor force	0.640	0.480	0.626	0.484	0.885	0.319	0.872	0.334
Employed*	0.934	0.249	0.934	0.249	0.929	0.256	0.923	0.266
At work*	0.969	0.174	0.959	0.199	0.977	0.150	0.978	0.148
Part time*	0.390	0.488	0.360	0.480	0.163	0.370	0.176	0.381
log hrswork*	3.410	0.576	3.440	0.562	3.677	0.432	3.651	0.448
log hourwage*	4.303	0.834	4.233	0.685	4.358	0.765	4.259	0.639
Jury Law	0.0608	0.239	0.374	0.484	0.0562	0.230	0.384	0.486
Indecency Law	0.261	0.439	0.365	0.481	0.260	0.439	0.367	0.482
Any place Law	0.363	0.481	0.890	0.313	0.357	0.479	0.888	0.315
N	30,752		9,574		516,657		156,679	
Spouse covariates:								
Spouse's Age	33.27	5.287	33.65	5.365	33.26	6.045	33.54	5.990
Spouse is nonwhite	0.112	0.315	0.163	0.369	0.111	0.315	0.165	0.371
Spouse is highschool grad	0.261	0.439	0.254	0.435	0.277	0.448	0.253	0.435
Spouse has some college	0.253	0.435	0.239	0.426	0.281	0.450	0.278	0.448
Spouse is college grads	0.299	0.458	0.336	0.472	0.264	0.441	0.329	0.470
Spouse in labor force	0.966	0.181	0.963	0.189	0.724	0.447	0.686	0.464
N	21,606		6,641		249,397		71,353	

NOTES: * The number of observation is different as the variable is defined conditional on the mother ever breastfeed.

Table 8: Effects of the Workplace Benefits on the Breastfeeding Outcomes

	(1)	(2)	(3)	(4)
	Panel A. ever breastfeed			
Workplace	0.00797*	0.00870	0.00968**	0.00759*
	(0.00441)	(0.00529)	(0.00455)	(0.00460)
Observations	201,516	201,516	201,516	200,302
	Panel B. log weeks of breastfeeding			
Workplace	0.0549*	0.0466	0.0465	0.0322
	(0.0307)	(0.0327)	(0.0284)	(0.0250)
Observations	153,983	153,983	153,983	152,934
Covariates	N	Y	Y	Y
Statetrend	Y	Y	Y	Y
Other Policies	N	N	Y	N
Region by Year FE	N	N	N	Y

Notes: Panel A reports marginal effects from Probit regressions. Panel B reports estimates of parameters from from Tobit regression. All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Effects of the Workplace Breastfeeding Benefits: Extensive Margin

SAMPLE	(1) All	(2) Single	(3) Married	(4) Married
		Panel A. in labor force		
mean of dependent variable	0.858	0.777	0.922	0.922
workplace X infant mom	0.0110***	0.0143**	0.0137***	0.0136***
	(0.00214)	(0.00653)	(0.00196)	(0.00197)
Observations	632,881	279,190	353,691	353,691
R-squared	0.887	0.871	0.908	0.908
		Panel B. employed		
mean of dependent variable	0.929	0.886	0.957	0.957
workplace X infant mom	-0.00435	-0.0171	-0.000747	-0.000130
	(0.00692)	(0.0182)	(0.00588)	(0.00594)
Observations	543,222	217,001	326,221	326,221
R-squared	0.109	0.117	0.056	0.057
		Panel C. at work		
mean of dependent variable	0.972	0.973	0.972	0.972
workplace X infant mom	-0.00638	-0.0296	2.30e-05	3.79e-05
	(0.00784)	(0.0216)	(0.00700)	(0.00697)
Observations	504,497	192,219	312,278	312,278
R-squared	0.029	0.013	0.042	0.042
spouse covariates	N	N	N	Y

Notes: All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 10: Effects of the Workplace Breastfeeding Benefits: Intensive Margin

SAMPLE	(1) All	(2) Single	(3) Married	(4) Married
		Panel A. log hours work		
mean of dependent variable	3.654	3.534	3.728	3.728
workplace X infant mom	0.0332**	-0.0234	0.0514***	0.0521***
	(0.0150)	(0.0199)	(0.0184)	(0.0183)
spouse covariates	N	N	N	Y
Observations	490,499	186,950	303,549	303,549
R-squared	0.162	0.185	0.083	0.084
		Panel B. part time		
mean of dependent variable	0.180	0.281	0.118	0.118
workplace X infant mom	-0.0286**	0.0425*	-0.0469***	-0.0470***
	(0.0137)	(0.0231)	(0.0145)	(0.0145)
spouse covariates	N	N	N	Y
Observations	490,499	186,950	303,549	303,549
R-squared	0.167	0.197	0.074	0.074
		Panel C. log hourly wage		
mean of dependent variable	4.334	4.232	4.396	4.396
workplace X infant mom	0.0378**	0.0741	0.0382*	0.0400*
	(0.0177)	(0.0506)	(0.0208)	(0.0204)
spouse covariates	N	N	N	Y
Observations	482,560	183,535	299,025	299,025
R-squared	0.064	0.046	0.067	0.068

Notes: All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11: Alternative specifications, Effects on the labor force participation

VARIABLES	(1) main	(2) unweighted	(3) state cov	(4) state trends	(5) region by year FE	(6) other policies
			Panel A. in labor force			
workplace×infant mom	0.0136***	0.0139***	0.0136***	0.0136***	0.0135***	0.00308
	(0.00197)	(0.00193)	(0.00197)	(0.00197)	(0.00197)	(0.00231)
anyplace×infant mom						0.0127***
						(0.00257)
jury×infant mom						0.00721***
						(0.00267)
indecency×infant mom						0.0100***
						(0.00268)
Observations	353,691	353,695	353,691	353,691	353,691	353,691
R-squared	0.908	0.911	0.908	0.908	0.908	0.908

Notes: All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12: Alternative specifications, Effects on the log of hours work

VARIABLES	(1) main	(2) unweighted	(3) state cov	(4) state trends	(5) region by year FE	(6) other policies
			Panel B. log hours work			
workplace×infant mom	0.0521***	0.0476**	0.0524***	0.0525***	0.0525***	0.0360*
	(0.0183)	(0.0186)	(0.0183)	(0.0182)	(0.0183)	(0.0213)
anyplace×infant mom						0.0463***
						(0.0170)
jury×infant mom						-0.0257
						(0.0252)
indecency×infant mom						-0.0177
						(0.0185)
Observations	303,549	303,553	303,549	303,549	303,549	303,549
R-squared	0.084	0.088	0.084	0.084	0.085	0.084

Notes: All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 13: Alternative specifications, Effects on the log of hourly wage

VARIABLES	(1) main	(2) unweighted	(3) state cov	(4) state trends	(5) region by year FE	(6) other policies
			Panel C. log hourly wage			
workplace×infant mom	0.0400*	0.0276	0.0400*	0.0401*	0.0404*	0.00957
	(0.0204)	(0.0183)	(0.0204)	(0.0204)	(0.0203)	(0.0221)
anyplace×infant mom						0.0592***
						(0.0180)
jury×infant mom						-0.00709
						(0.0218)
indecency×infant mom						-0.0170
						(0.0154)
Observations	299,025	299,029	299,025	299,025	299,025	299,025
R-squared	0.068	0.065	0.068	0.068	0.068	0.068

Notes: All regressions have individual level covariates, state fixed effects and year fixed effects, and are weighted by the supplemental weights. Robust standard errors in parentheses, and are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.