Maternity Leave and the Responsiveness of Female Labour Supply to Household Shocks

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Abstract

Female labour supply can insure households against shocks to paternal employment. The paper estimates whether the female labour supply response to a household shock differs by eligibility to maternity employment protection. We exploit time-state variation in the implementation of unpaid maternity leave through the Family and Medical Leave Act (FMLA) in the US which increased employment protection from 0 to 12 weeks. We find that mothers eligible for FMLA speed up their return to work in response to a paternal shock, with a conditional probability of being in work 53% higher than in households with no paternal shock. On the other hand, there was a negligible insurance response for mothers with no employment protection. Female labour supply is a more effective insurance mechanism if mothers have employment protection during pregnancy.

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Key Words: Female labor Supply; Insurance; Maternity Leave. JEL Codes I30; J13; J20; J64.

1 Introduction

An important policy question asks how families insure themselves against shocks to income. We know there is imperfect insurance as both consumption and child human capital respond to unexpected changes to income.[1] Since women have entered the labor force, female labor supply has become a potential form of household insurance. However despite this, insurance is imperfect and there are welfare implications to income shocks.

This paper analyses whether access to unpaid maternity leave drives the responsiveness of female labor supply to household shocks. Specifically, we exploit time-state variation across US states in the implementation of unpaid maternity employment protection to ask whether this policy enabled mothers to more effectively smooth the effect of paternal shocks around the date of childbirth. In the US there was no federal legislation regarding maternity leave until the Family and Medical Leave Act (FMLA) was introduced in 1993, which allowed 12 weeks of unpaid maternity leave.[2] However, some states implemented their own version of the policy as early as 1972[3]. We hypothesize that this employment protection eliminated search frictions associated with job search of mothers post childbirth and consequently enabled mothers to respond to a paternal employment shock by returning to work more easily.

We find that mothers eligible for FMLA speed up their return to work in response to the paternal employment shock. The conditional probability of observing a mother in work after a paternal employment shock is 53% higher than households with no employment shock, but only if the mother is covered by FMLA. On the other hand mothers with no maternity employment protection are unable to use their labor supply to insure households, as there is a negligible effect of the shock on the conditional probability of moving back into work. It is important to distinguish between part- and full-time work. The treatment effect of FMLA

[1] Attanastio and Davis (1996) reject full insurance of consumption against shocks and Blundell, Pistaferri and Preston (2008) find only partial insurance of consumption against permanent shocks and full insurance of transitory shocks for non-poor households. Carneiro, Salvanes and Tominey (2010) estimate human capital responses to permanent income shocks which decline across the child life cycle and responses to transitory shocks which are flat across child age. Finally, Carneiro and Ginja (2012) argue that parental investments in child human capital are close to being fully insured, with only small response of investments to permanent shocks and full insurance against transitory shocks.

[2] Conditions for eligibility, discussed in Section 2, include working for the employer for at least 1250 hours in the year before birth and a firm size of at least 50.

[3] Waldfogel (1999) found leave to increase as a result of FMLA and Berger and Waldfogel (2004) found for mothers working before birth, those covered by FMLA were more likely to take at least 12 weeks.

led to a full-time labor supply response to the paternal shock to be 50 percentage points higher in FMLA areas, however there was no significant shift into part-time work for either the treatment or control group. FMLA only offered employment protection if mothers had worked 1250 hours in the previous year and hence part-time workers are less likely to have been eligible. All results suggest that female labor supply is more effective as an insurance mechanism if search frictions are reduced through employment protection.

Focusing on female labor supply around the timing of a birth is important for two reasons. Firstly, although the profile of life cycle labor force participation for married females is similar to that of males, albeit at a lower level (Figure 1a), the participation of mothers around the birth of a child differs remarkably. Figure 1b shows that parental employment is more or less constant up to the birth of a child, however pre-childbirth maternal labor supply rises up to the birth of a child, drops down at the birth and subsequently increases smoothly so that by the time children are aged 30, maternal labor force participation is much closer to paternal participation. Phipps, Burton and Lethbridge (2001) find that 80% and 1% of job disruptions are due to childbirth for females and males respectively. In our data around 73% of women return to work eventually, but there is heterogeneity in the timing of this return. Secondly, this approach abstracts from the asymmetry often assumed, that female labor supply responds to male shocks but not vice versa as we observe mothers when they have just given birth so are at home with their child.[4]

Moreover, the literature suggests that this is an important topic. According to Attanasio, Low and Sanchez-Marcos (2008), the household welfare cost of greater uncertainty in male income is larger when females are unable to adjust their labor supply in response to the uncertainty. In states with no employment protection during the maternity period, in order to re-enter the labor market upon realization of a negative paternal income shock, the woman has to find a job. If there are search frictions, we expect to find that women are less able to adjust their labour supply in labor markets with no maternity protection.[5]

[4] Goux, Maurin and Petrongolo (2011) found the opposite asymmetry from a policy in France that restricted working hours for employees of participating firms, whereby results suggested that husbands adjusted their labor supply to their wives's hours rather than the other way around.

[5] Bergemann and Van Den Berg (2008) and Evers, De Mooij and Van Vuuren (2006) both find female labour supply to be more responsive to market frictions than male labour supply.

Our paper is related to a literature which has found that female labor supply as an insurance mechanism is responsive to government policy. According to Cullen and Gruber (2000) when the male in the household is unemployed, female labor supply response depends upon the level of unemployment insurance. Similarly, in order for wives to secure health insurance which is offered primarily to full-time employees, female labor supply hours increase in the absence of husbands' health insurance (Buchmueller and Valletta, 1999). Our paper analyses the female labour supply response to a paternal shock across eligibility to unpaid maternity leave.

To do this, we construct monthly labour market status of mothers and fathers in the US Panel Study of Income Dynamics (PSID), starting from the month they have a child. The parents are followed up to the time that the mother changes state, either to re-enter the labour market or to have another child. In between the birth and the change of state the father may experience an exogenous shock by losing his job due to firm closure. This is a meaningful shock as 8% of the sample experience layoff prior to the mother changing state. Using a duration model, we estimate whether mothers speed up their return to work after birth in response to the paternal job loss and specifically whether the marginal effect of layoff differs by FMLA eligibility. In considering the decision to return to work of a mother, it is also important to control for her future fertility decisions[6]. She may exit the state of staying at home to return to work, but also by having another child. The competing risk methodology allows to estimate the determinants of the timing of the return to work, controlling for fertility decisions.

In interpreting our results, we consider two potential sources of endogeneity, 1) endogeneity of the paternal employment shock and 2) endogeneity of the adoption of FMLA. The potential endogeneity of the paternal employment "shock" may cause a bias if, for example the father has been laid off in the past. Stevens (1997) describes a consequence of layoff is future job uncertainty. As such whilst the first layoff may be an exogenous shock, future layoffs are instead an outcome and may be predicted by mothers. We are able to exploit information on previous paternal layoffs before the timing of childbirth and we find evidence that for mothers whose partner has been laid off in the past, the contemporaneous layoff is

[6] For example, Del Bono, Weber and Winter-Ebmer (2012) find fertility effects of female job displacement.

not a shock. For mothers with no maternity employment protection but whose partner has been laid off in the past, there was a large and significant increase in the conditional probability of being in work in response to a paternal shock by 45%. There was no significant difference in the insurance response for the treated group, by previous paternal layoff. The next question to ask is whether the first layoff is really exogenous. It could be argued that the first layoff experienced is not a shock, if "bad" fathers who are laid-off live with mothers who return to work quickly after childbirth. However this is true in all households which experience a first layoff shock, irrespective of FMLA eligibility. But as we find very different effects of the shock by FMLA eligibility, it suggests that this bias cannot drive our results.

The second potential failure of our identification strategy would be that states which are amenable to female labor supply voluntarily opt for maternity employment protection prior to the 1993 federal legislation. In this case, female labor supply would be more responsive to household shocks in FMLA states for endogenous reasons. The treatment variable in the bulk of analysis takes the value of 1 if mothers are eligible for FMLA, i.e. they live in an FMLA state, worked during pregnancy and their child is older than 3 months. The control group therefore consists of mothers in non-FMLA states and those in FMLA states who either did not work during pregnancy or whose child is older than 3 months. We test for the endogeneity of FMLA adoption by dropping mothers in non-FMLA areas from the control group and redefining the group to be mothers in FMLA areas who worked during pregnancy, but who are ineligible for FMLA when they experience the paternal shock, owing to their child being older than 12 weeks. The results are the same, that female labour supply only responds to a paternal shock if the mother is eligible for FMLA.

There are important policy implications from this paper. In areas where eligibility to FMLA has expired because the child is older than 12 weeks, mothers are less able to insure their households against household shocks. The welfare consequences of a household shock will be felt by adults (Black, Devereux and Salvanes 2012 find health effects in Norway) but also by child human capital (see Duncan and Brooks-Gunn 1997, Carneiro, Salvanes and Tominey 2010, Carneiro and Heckman 2003, Currie 2009, Dahl and Lochner 2012 and Carneiro, Lopez, Salvanes and Tominey 2013 for examples).

The paper proceeds as follows. Section 2 describes the maternity leave legislation in the

US. Section 3 details the data and section 4 the methodology. Results are in section 5 and the conclusion in section 6.

2 Maternity Leave Legislation

Figure 2 shows the entitlement to weeks of leave around childbirth in OECD countries, distinguishing between paid leave (the total weeks * proportion of average pay received) and the incremental unpaid leave. It includes not just maternity leave, but additional rights to unpaid parental leave. In terms of total leave available to mothers, Scandinavian and Eastern European countries fare well. Currently the US federal legislation grants mothers 12 weeks of unpaid leave around the birth of a child and no paid leave at all. This is the least generous of any other OECD country.

Up until 1993 there was no federal legislation regarding maternity leave in the US. Despite this, some states had chosen to implement a job protected maternity leave prior to this[7]. Mothers without access to maternity employment protection could accrue annual leave, in order to spend some time at home with their new child. In 1993 legislation was passed and now all states are obliged to offer 12 weeks of protection within a 12 month period, albeit unpaid, to mothers under the Family and Medical Leave Act (FMLA).[8] There are two conditions, firstly the firm must be large with at least 50 employees and secondly the women must have accrued at least 1250 hours of employment in the past 12 months. Over time, some states have made changes to the eligibility rules for FMLA in terms of weeks of leave, the previous 12 month hourly requirement and the firm size[9]. The most significant departure was in 2004, where three states have attached a pecuniary benefit to the leave, California being the first to do this.[10]

In our data, firm size is not observed and the hours worked by women is recorded for

[7] These states were California, Connecticut, District of Columbia, Maine, Massachusetts, Minnesota, New Jersey, Oregon, Rhode Island, Tennessee, Vermont, Washington and Wisconsin.

[8] The FMLA covered absenses from work for other reasons than maternity, such as the need to care for an ill family member.

[9] See Espinola-Arrendondo & Mondal (2010) for details. Only 4 states expanded FMLA for both private and public sector employees. These were Conneticut, Maine, Oregon and Vermont.

[10] Rossin-Slater, Rhum and Waldfogel (2011) provide an evaluation of the extension in California.

a calendar year rather than the 12 months prior to pregnancy. Our definition of FMLA coverage is initially limited to an on-off treatment. Treatment is set equal to one if children are born on or after the month FMLA was implemented in the state, in the first three months of birth of the child and if the mother worked during pregnancy. It is set equal to zero otherwise, where we control for pre-pregnancy employment status of the mother. We then estimate the effects of FMLA, distinguishing between movements into part- and full-time work. This partially addresses the hour requirement for eligibility as full-time workers are much more likely to meet the rule. Note that Galinsky, Bond, Sakai, Kim and Giuntoli (2008) estimate that the proportion of small employers offering coverage was not statistically different the proportion of large employers (79% and 82% respectively). In Section 5.5 we experiment with the control group, setting it equal to one only if mothers worked during pregnancy and then additionally restrict the sample to observations in the first three months after birth (the latter control group consists only of mothers in non-FMLA areas).

As much of the variation in FMLA status comes from voluntary policy changes of states prior to 1993, a concern is that FMLA status is correlated with a general positive attitude towards women working. Because of this we define a fourth definition of the control group, to include only mothers in FMLA states who worked during pregnancy but who were ineligible for FMLA because their child was older than 12 weeks of age.

3 Data and Descriptives

The main data comes from the US Panel Study of Income Dynamics (PSID). The PSID comprises a representative sample of households followed since 1968. Members in the household were followed annually until 1997 and then biennially until 2009. As the survey is household based, information is collected on any descendents, creating a cross-generational dataset. Monthly retrospective labor market status, including employment, time out of the labor force and unemployment was available for each year between 1984-1997 and this is our sample period. We constructed a sample of male-female pairs and follow the parents from when the child was first born up until the month the mother either re-enters work or has another child. A state-change to employment or fertility is an absorbing state and no

further observations for that mother are included in the sample.

There are 2340 children in the sample and 1560 households. With the time dimension, there are 30664 observations.

Both women and men report whether they were employed at least part of each month of every month of the previous year. The indicator for exogenous paternal employment is generated from a question asking whether the respondent's job changed since January in the previous year. If it did, the reason for the change is recorded. Similarly to Rhum (1991) and Stevens (1997) the job loss is assumed exogenous if the reason stated was from plant closure, being laid off or fired. A potential problem with identification is that fathers fired from jobs may be non-random in the population and these are included in the involuntary job loss variable. However according to Boisjoly, Duncan and Smeeding (1994), only 15.7% were fired and the majority were laid off. We create a monthly measure of exogenous job loss, by combining this information with monthly retrospective data on the individual being unemployed but looking for work.

Additional data is merged at the state level onto the PSID in order to control for labor market opportunities for women. We collect state level employment information of women from the Current Population Survey (CPS) Merged Outgoing Rotation Groups (MORG), available since 1979. Employment rates of the civilian labor force aged 16 or over are calculated for each state, stratifying by the education of the woman. Education levels are defined as having no qualifications, a high school or finally a degree (a 4 year college degree or more). Women are defined as being in employment if they report having a job for the entire month, having worked all weeks, or if they missed one or more weeks but not because of a layoff. Finally, data on state level maternity leave legislation was taken from Baum (2003).

Table 1 shows the sample statistics. The child-level sample includes families across time from the birth of each child. 7.9% of fathers are exogenously laid off from their jobs after the birth of a child and before the mother changes state. 15.6% of fathers had experienced layoff in the past, or 39.0% of fathers conditional upon contemporaneous monthly layoff taking the value of 1. 41.0% of mothers reported working during childbirth. 23.5% of fathers and 18.3% of mothers have a degree and the average age of fathers and mothers is 33 and 30 respectively. Looking at the state-time level variable, the average employment rate

for women was 60.5%. The state labor market variable used in the analyses matched the relevant rate to the maternal education level.

On average 28% of the observations have some unpaid maternity leave legislation and 6.3% of observations are treated (which means they live in FMLA states, worked during pregnancy and their child is no older than 3 months old). Finally the table details statistics relating to the age that the mother moves state, to re-enter employment (12807 mothers with a mean of 26 months), have another child (5181 mothers with a mean of 32 months) or never change their state (12676 mothers). Figure 3 plots the distribution of the age at which mothers re-enter the labor force after having a child, given that this is their destination state. 6% of mothers return to work in the first month of the child's birth.[11] Around 50% of mothers have returned by the time the child is aged 1.5 and the latest state change is for the child aged 8.4, suggesting a large amount of heterogeneity.

We observe the mother to be at home with their child or to have moved to a destination state - either employment or fertility. As the destination states are absorbing Table 2 shows that in any month 93.7% of mothers are at home with their child, 5.55% are in employment and 0.75% are in a fertility state which means that in that month they have a child.

4 Methodology

The paper aims to identify whether mothers' labour supply is responsive to household employment shocks, using a discrete time duration model.[12] Specifically, do mothers speed up their return to work in response to a paternal employment shock and how does maternity leave cover affect this response.

The choice of mothers to re-enter employment after childbirth is likely to be taken simultaneously with the choice over further fertility. We model three choices of a mother in any time period t - to remain at home with the first child, to have another child or to (re-)enter the labor market conditional upon being at home in period $t-1$ where t refers to the age of the child in months. We use a competing risk model, where there exist two mutually

[11] This number is similar to Han, Rhum, Waldfogel and Washbrook (2008).
[12] This section follows the notes of Stephen Jenkins.

exclusive absorbing destination states $j = \{w, f\}$, where w and f denote work and fertility. The hazard function at time t, $h(t)$ is the sum of the hazard for destination to state w and f ($h_w(t)$ and $h_f(t)$ respectively). The hazard for exit to state w (f) is given by the probability of exit to w (f) in period t, given the individual remained at home with the child up to period $t-1$. We refer to this below as the conditional probability. Let y_{it} denote the state of mother i for child age t months. y_{it} takes the value of 0 if mothers do not move state and are at home with their child, 1 if they move to work and 2 if they have another child. The state-specific hazard functions are defined as follows

$$h_j(t) = \Pr\left(y_{it} = j | y_{it-1} = y_{it-2} = .. = y_{i0} = 0, x_{it}, layoff_{it}, D_{it}\right); j = \{w, f\} \tag{1}$$

where $layoff$ is an indicator taking the value of 1 if the father is exogenously laid off from his job and 0 otherwise and D is the treatment dummy taking the value of 1 if mother is covered by maternity leave in the month (if they live in a state with FMLA, worked during pregnancy and the child is no older than 12 weeks old) and 0 otherwise. x denotes the control variables which include the logarithm of time (the state dependence variable), the paternal and maternal age and education and maternal year of birth, family size, ethnicity and dummy variables for previous paternal layoff, maternal working pre-pregnancy and the state-level female education-specific employment rate.[13]

The likelihood function for destination state w is then given by

$$\mathcal{L}^w = h_w(t) S(t-1) = \frac{h_w(t)}{1 - h_w(t) - h_f(t)} S(t) \tag{2}$$

where $S(t)$ denotes the survivor function at period t. The likelihood function for destination state f $\left(\mathcal{L}^f\right)$ is defined similarly.

The data is right censored, as a mother may not return to work or have another child during the sample period, i.e. she may remain at home with her child.[14] The contribution to the likelihood of a censored case ($\mathcal{L}^c$) is simply the survivor function

[13] There is a worry that paternal layoff is more likely in a downturn and as such the women will find it harder to re-enter the labour market.

[14] The time of censoring differs across observations.

$$\mathcal{L}^c = S(t) = \prod_{k=1}^{t} \left[1 - h_w(k) - h_f(k)\right] \tag{3}$$

The contribution to the likelihood function of an individual is given by

$$\left(\mathcal{L}^w\right)^{\delta^w} \left(\mathcal{L}^f\right)^{\delta^f} \left(\mathcal{L}^c\right)^{1-\delta^w-\delta f} \tag{4}$$

where δ^j denotes the exit state indicator for $j = \{w, f\}$. Following Allison (1982) we assume a logistic distribution to allow estimation of the duration model by a multinomial logit. In this case the hazard function for exit to state w is

$$h_w(t) = \frac{\exp\left(\beta_w' \mathbf{X}\right)}{1 + \exp\left(\beta_w' \mathbf{X}\right) + \exp\left(\beta_f' \mathbf{X}\right)} \tag{5}$$

where $\mathbf{X}$=$(x_{it}, layoff_{it}, D_{it})$. The hazard function for exit to state f is defined similarly.

We are interested in the interaction between layoff and FMLA.[15] We calculate the marginal effect of layoff on the conditional probability of observing the mother in state j at time t for the treatment status equal to zero and one, given she was at home up to period $t-1$. The difference between these predicted probabilities is the effect of maternity cover upon the responsiveness of female labor supply to a paternal employment shock.

$$\begin{aligned} &E\left[\frac{\partial \Pr\left(y_{it} = j | y_{it-1} = .. = y_{i0} = 0, x_{it}, layoff_{it}, D_{it}\right)}{\partial layoff} | D = 1\right] - \\ &E\left[\frac{\partial \Pr\left(y_{it} = j | y_{it-1} = .. = y_{i0} = 0, x_{it}, layoff_{it}, D_{it}\right)}{\partial layoff} | D = 0\right] \end{aligned} \tag{6}$$

The marginal effect will give information on how a paternal employment shock changes the conditional probability of observing a mother in a particular state, given different maternity leave policies. However, the size of the marginal effect will fall as the unit of time in the sample becomes smaller because the probability of moving states falls. We adopt the method of Dlugosz, Stephan and Wilke (2009) and normalize the marginal effect by the

[15] We follow Ali and Norton (2003) and do not consider the coefficient on the interaction between layoff and FMLA from the multinomial logit as the relevant parameter estimate.

predicted probability of being in state j for an average individual with no paternal shock. This relative marginal effect (RME) is the percentage change in the conditional probability of being in state j when changing from no paternal shock to a paternal employment shock.

5 Results

5.1 Graphical Results

Figure 4a presents the Kaplan-Meier empirical hazard function for first re-entry to the labor market, considering only the last birth observed for each women, to eliminate the possibility of future movement out of the labor market due to childbirth. The hazard function is highest just after childbirth and falls noisily thereafter. To investigate the role of maternal labor supply as an insurance mechanism against paternal income shocks, the hazard functions are plotted against the time since the father was laid off exogenously. Figure 4b shows that the hazard rate before layoff is fairly flat, but there is a jump one year after layoff and then a smooth decline. The post-layoff hazard does not recover to pre-layoff levels for 5 years. Consequently, mothers insure the household against a paternal shock, by moving to the labor market in response to a paternal employment shock. Ideally, calculation of the hazard would allow more flexible treatment of further fertility than restricting the graph to the last observed birth. However the Kaplan Meier curves cannot allow for such competing risks and therefore regression analysis is the next step.

5.2 Regression Results

Table 3 reports the marginal effect of a paternal employment shock upon the conditional probability of observing a mother in state j, where $j = \{w, f\}$ or at home with the child. The treatment variable allows us to analyze how the responsiveness of female labor supply after a paternal employment shock varies with maternity leave coverage. The coverage offered new mothers employment protection around the timing of the birth and we hypothesize that it would facilitate the insurance mechanism of female labor supply by reducing search costs involved with returning to work.

We define the variable Treatment to equal one for eligible mothers in states with some maternity cover and 0 otherwise. Mothers were only eligible for job protection if they worked for 1250 hours in the year prior to birth (which we proxy with an indicator for working during pregnancy) and protection lasts only for 12 weeks (measured as 3 months in the data). Hence we set the treatment indicator equal to zero in FMLA states if either of these criteria are not met. The control variables include the logarithm of time, the paternal and maternal age and education and maternal year of birth, family size, ethnicity and dummy variables for previous paternal layoff, maternal working pre-pregnancy and the state-level female education-specific employment rate.

We see in column (1) that the marginal effect of paternal layoff has no effect on the return to work for mothers with no employment protection during maternity The coefficients are small and insignificant. These mothers are unable to insure their household against the shock. For mothers eligible for FMLA, paternal layoff raises the conditional probability of returning to work by 14.7 percentage points or the relative marginal effect of 53.12%. This means that the probability of the eligible mother being in work after a paternal layoff is 53.12% higher than an average household with no layoff. We see a simultaneous decrease in the probability of mothers being at home with their child.

5.3 Part-Time and Full-Time Employment

In a model of female labor supply, Francesconi (2002) notes the need to distinguish between full- and part-time employment, as each exhibits a different wage-experience profile and are differentially substitutable with leisure. In the data, 37% and 30% of women work full- and part-time respectively. Table 4 estimates the role of maternity leave cover in driving female labor supply as an insurance mechanism, looking at women returning to part-time work (column 1) and full-time work (column 2). In the PSID data, part- and full-time work history is available only on an annual basis rather than monthly. In order to extend the analysis to distinguish between part- and full-time work we must assume that mothers do not change between the two states within a year.

For the untreated sample, mothers respond to a paternal shock by shifting into part– and full- time work, although the changes are insignificantly different to zero. This shows that

again there no insurance response for non-treated mothers, who are unable to adjust their labor supply to help smooth the effect of the paternal shock.

For treated mothers, the movement across groups changes and we observe a speed up of the return to both part- and full-time work. The effect is close to double for the return to full-time work, where the conditional probability of being in full-time work is 10 percentage points or 63% higher in the households with a paternal shock. The layoff shock raises the conditional probability of returning to part-time work by 4.3 percentage points or 36%, but is insignificant. We would expect a larger shift to full-time work and not part-time work, as eligibility for FMLA required at least 1250 hours worked in the previous 12 months so part-time workers are less likely to be eligible.

In summary, we do see a significant speed up of the return to full-time work for mothers with access to FMLA. The treatment effect is now around a 63% higher conditional probability of being in full-time employment as a result of the paternal shock, for mothers with maternity employment protection. In addition, mothers without employment protection do not significantly change their work status in response to the shock.

5.4 Layoff History

Stevens (1997) notes that being laid off from work leads to future job uncertainty which can take the form of further layoffs. The layoff variable is interpreted in the paper a shock to employment status, but for fathers with past lay-off experience it may be an outcome of a past event rather than an exogenous change and consequently predictable by the mother. In Table 5 we stratify the sample using information on previous layoffs experienced by the father. The analysis above controlled for the indicator for previous layoff but now we explore whether the interaction between the maternal labor supply response to a shock and maternity leave entitlement differs significantly across the two groups.

Panel (a) and (b) of Table 5 splits the sample into those where the father had no layoff prior to the birth and those with some experience respectively. Each panel estimates the treatment effect and we compare whether the response of mothers to a shock differs according to eligibility for maternity employment protection. For the untreated sample of mothers whose partner has no previous experience of layoff, the results are broadly similar with those

of Table 3. Untreated mothers do not speed up the return to work in response to a paternal shock, however with access to FMLA there is a shift from being at home to moving back into work. With maternity employment protection, the conditional probability of being in work is 14 percentage points or 49% higher if the father is laid off than otherwise, and the conditional probability of being at home falls by 14.9 percentage points or 21%.

For the group of mothers whose partner was laid off in the past, we see a different pattern. Firstly for the treated mothers, whilst the relative marginal effects look very different, none of the effects are significantly different when comparing across the previous layoff categories.[16] The sample size for the final regressions of treated mothers with previous layoff exposure is very small at 206. If we loosen the definition of treatment and include mothers in FMLA areas who worked during pregnancy (i.e. we drop the restriction that the child must be aged 12 weeks or less), the RME for return to work falls to 32.67% which is more similar to the effect for the no previous layoff sample. The difference is noticed instead for the effect of paternal layoff on the untreated mothers, where now even with no employment protection, the effect of a paternal shock is to increase the conditional probability of working by 45.16%.

In summary, it seems that for mothers whose partner has been laid off in the past, the current layoff is not a shock. Mothers with no maternity employment protection respond more effectively, moving back into work more quickly than for untreated mothers whose partner has no prior experience of layoff. For mothers with employment protection, the labor supply response to the shock is broadly similar across the previous layoff groups and the mothers with no previous experience of paternal layoff are able to respond as effectively as the mothers whose partner had a previous layoff history.

5.5 Robustness Checks

The robustness checks vary the definition of the control group used for analysis. Table 6 reports the results for the control group only. There are three differences between mothers in treatment and control groups - FMLA status, incidence of working during pregnancy and

[16] The t-statistics for the test of same coefficients estimated in panels (a) and (b) are, in the treated sample 0.441, -0.363 and -0.108 for return to work, at home with child and ferther fertility respectively. For the untreated samples the t-statistics are 2.36, -2.58 and 1.00.

the age of the child in the regression as mothers were eligible for FMLA only for the first 12 weeks of birth. To remove the latter two differences we estimate the marginal effect of layoff, defining the control group sample first if they worked during pregnancy (panel (a)) and additionally only for the first 3 months of birth (panel (b)). In both cases, the effect of a paternal layoff on female labor supply is insignificant as before. If mothers live in non-FMLA areas, the evidence suggests that they do not adjust their labor supply in response to a shock to paternal employment.

In addition, panel (c) controls for a potential problem with our identification strategy, that areas with FMLA cover may be more amenable to female labor force participation. If this were true, it would be easier for mothers in FMLA states to re-enter the labor market, irrespective of maternity leave protection and we would not estimate the causal effect of maternity employment protection on female labor supply as insurance. The panel (c) of Table 5 finds no support of this statement. We define the control group as mothers living in FMLA states, who worked during pregnancy but as their child was aged older than 3 months they were ineligible for FMLA. For these mothers, a paternal shock again has no significant effect on the conditional probability of being in work, suggesting that the treatment effect is the causal effect of FMLA on the insurance mechanism.

In summary,

6 Conclusion

If there were complete markets, households would fully insure themselves against shocks to income. This paper has shown that under certain restrictions, mothers are unable to effectively use their labor supply to smooth shocks to paternal employment. In particular, in the absence of employment protection during maternity, the conditional probability of a mother returning to work in response to a paternal employment shock is small and insignificant compared to 53% for mothers eligible for the FMLA. To give this effect some magnitude, the mean local employment rate of females in the sample was 62% and the standard deviation 1%, suggesting large shifts into work. Figure 1b showed the female participation rate to drop from 70% pre-pregnancy to around 55% thereafter, a change of 15%. So the additional

insurance response of female labor supply to a paternal shock in areas which protect employment for a spell around childbirth is larger even than this change. It seems that given the opportunity, households are keen to take advantage of the ability to self-insure against shocks. This could not be explained by state-effects, as restricting the control group to mothers in FMLA areas whose children were too old for eligibility still led to a negligible effect of the paternal shock.

If households are not adequately able to insure themselves there will be welfare consequences both to the adults in the household in terms of consumption but also to the children. Children living in households that experience income shocks tend to accumulate lower levels of education, have lower earnings are more likely to drop out from high school (Carneiro, Lopez, Salvanes and Tominey 2013). However, whilst it is positive that the FMLA improved insurance possibilities for families, a speed up of the return to work within the first 12 weeks of birth could be harmful for the child. Berger, Hill and Waldfogel (2005) find a speed up of the return to work by mothers after childbirth to be associated with a lower incidence of breastfeeding and immunization, and a higher prevalence of child externalizing behavioral problems. This suggests that in order to protect not just income levels but also child human capital against household shocks, an extension of the FMLA is required so that the mothers receive paid maternity leave for the period when maternal time with children is most crucial - in the first few months of life. This way, the mothers could negate the effect of the paternal income shock without returning to work. Carneiro, Loken and Salvanes (2011) found that a policy in Norway to extend maternity leave from 12 weeks of unpaid to 4 months of paid leave raised time that mothers spent with their children and improved human capital outcomes for the children, even into adolescence.

This analysis can be generalized to other countries, by analyzing the insurance response of mothers during a period of unpaid leave. If a mother was in a period of paid leave we may expect the response to a paternal shock to be close to zero as a mother would lose nothing by remaining on leave. As Figure 2 shows, for most countries unpaid leave constitutes around half of the total leave available, making the analysis highly relevant.

Blau and Kahn (2013) have suggested that limited parental leave policies in the US have meant that female labor supply has fallen behind OECD countries and this paper suggests

another consequence is that the female labor supply response to a shock is significantly lower if the mother has not retained her job.

7 Figures

Figure 1a

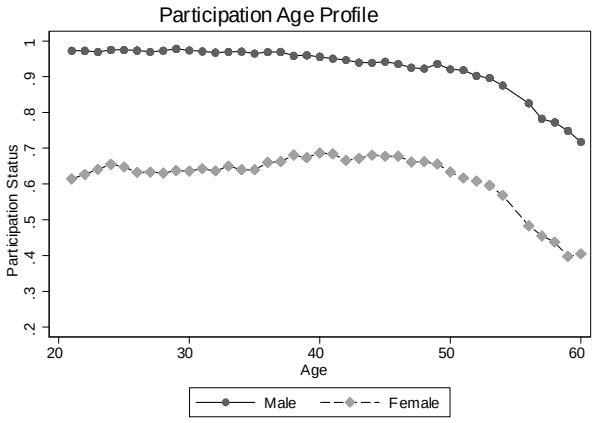


Figure 1b

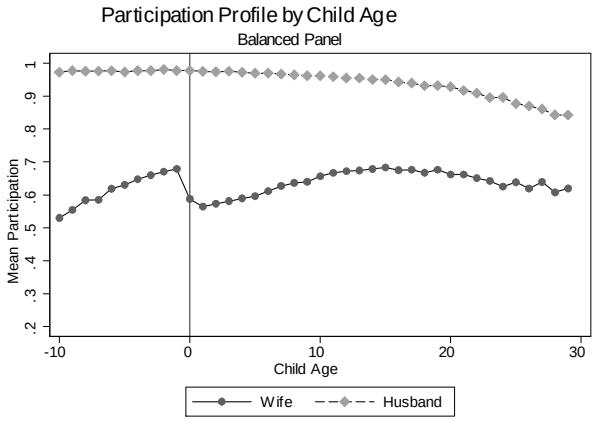
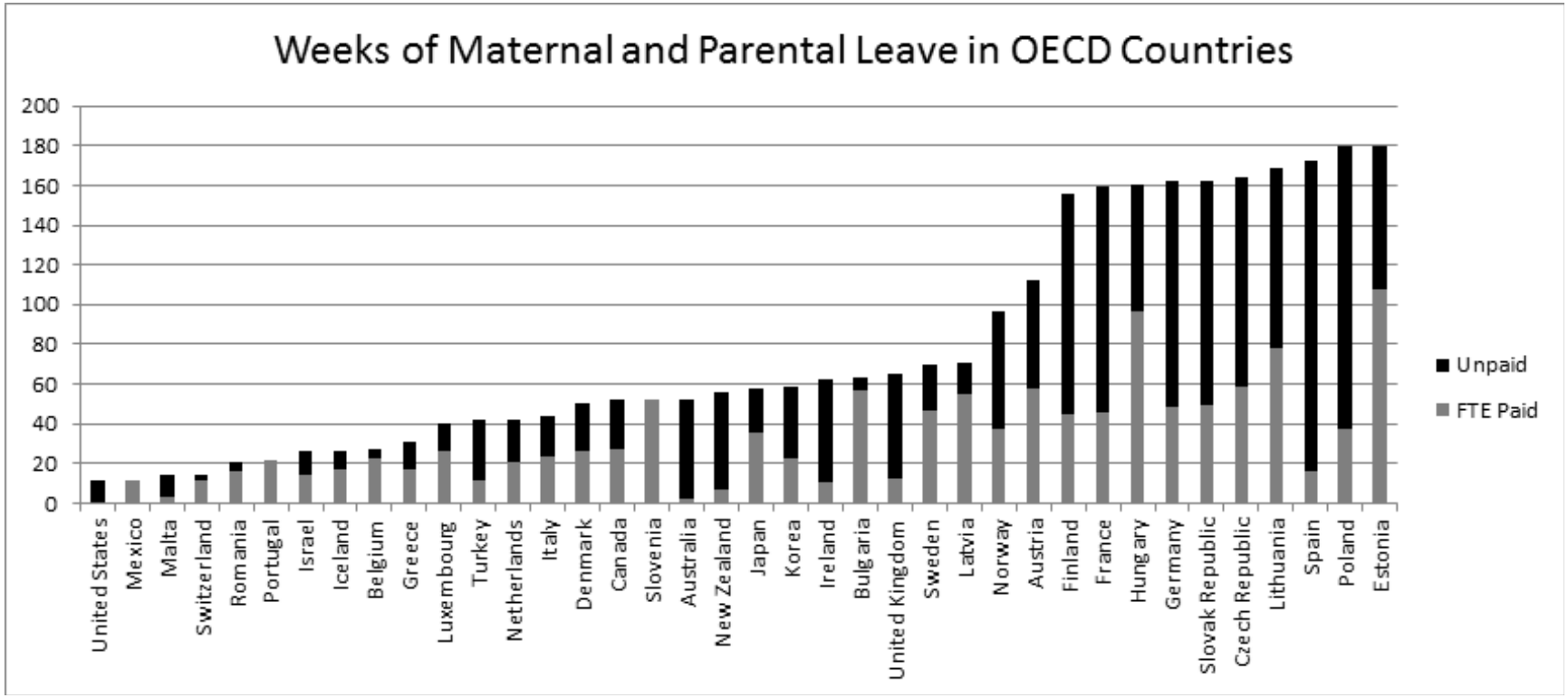


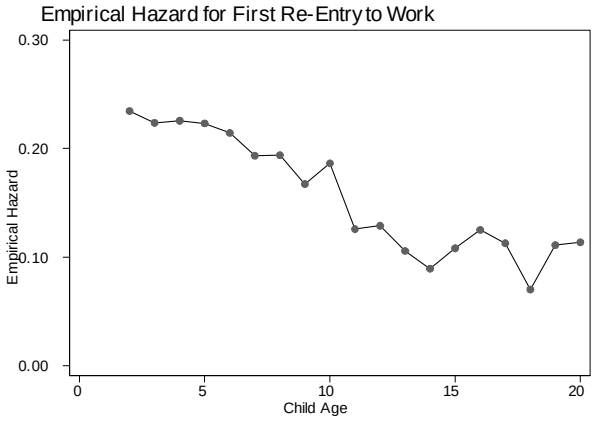
Figure 2



Source: OECD Family Database. Leave includes maternal leave and additional parental leave entitlement.

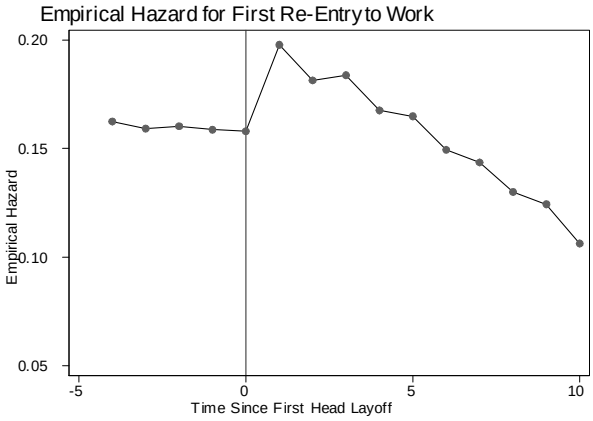
Figure 3

Figure 4a:First Re-Entry to the labor Market.



Sample includes all last births observed

Figure 4b: First Re-Entry to the labor Market.



Sample includes all last births observed

8 Tables

Table 1: Sample Statistics

Variable	Sample	Mean	Standard Deviation
Paternal Monthly Layoff	30664	0.079	0.269
Previous Layoff Indicator	30664	0.156	0.363
Maternal Work During-Pregnancy Indicator	30664	0.410	0.492
Father Degree Status	30664	0.235	0.424
Mother Degree Status	30664	0.183	0.387
Father Age	30664	33.156	6.881
Mother Age	30664	30.299	5.861
Local Education-Specific Female Employment Rate	30664	0.605	0.096
Family Size	30664	3.059	1.649
Maternity Leave Legislation Indicator	30664	0.280	0.449
Treatment Indicator	30664	0.063	0.243
Age return to work	12807	26.06	22.81
Age mother has next child	5181	32.24	17.30
Age of final observation if censored	12676	57.68	29.54

Local education specific female employment rate matches the state specific female employment rate by education categories no qualifications, high school or degree +.

Table 2: Duration Statistics: Monthly Maternal State

State	Sample	Proportion
At home with Child	28731	93.70
Work	1703	5.55
Fertility	230	0.75
Total	30664	100

Table 3: Competing Risk Estimation of labor Market Entry by Maternity Leave Policy

The marginal effect of paternal employment shock

	(1)	(2)	(3)
	Return to Work	At Home with Child	Further Fertility
Treatment = 0	0.005	-0.005	0.000
	(0.004)	(0.004)	(0.002)
RME	9.98%	-0.54%	6.10%
Treatment = 1	0.147***	-0.196***	0.008
	(0.059)	(0.065)	(0.012)
RME	53.12%	-27.24%	87.59%
N=30664			

Treatment = 0 if no maternity cover (FMLA=0) or maternity cover (FMLA=1) but mother didn't work pre-pregnancy or child again fourth month+. Controls include log time, paternal and maternal age and education, maternal year of birth, family size, ethnicity, dummies for previous paternal layoff, maternal working pre-pregnancy and state education-specific female employment rate.

RME is relative marginal effect: relative to probability of being in state for average individual with layoff=0.

Table 4: Competing Risk Estimation of labor Market Entry by Maternity Leave Policy: Part-Time and Full-Time Status

	(1)	(2)	(3)	(4)
	Return to PT Work	Return to FT Work	At Home with Child	Further Fertility
Treatment=0	0.001	0.003	-0.005	0.000
	(0.003)	(0.002)	(0.004)	(0.002)
RME	5.32%	13.17%	-0.48%	6.16%
Treatment =1	0.043	0.100*	-0.150***	0.008
	(0.042)	(0.052)	(0.059)	(0.012)
RME	36.33%	63.09%	-21.00%	9.00%

Controls include log time, paternal and maternal age and education, maternal year of birth, family size, ethnicity, dummies for previous paternal layoff, maternal working pre-pregnancy and state education-specific female employment rate. RME is relative marginal effect: relative to probability of being in state for average individual with layoff=0.

Table 5: Competing Risk Estimation of labor Market Entry by Maternity Leave Policy Stratifying by Previous Layoff Status of Father

	(1)	(2)	(3)
	Return to Work	At Home with Child	Further Fertility
(a) No Previous Layoff			
Treatment =0	0.000	0.001	-0.001
	(0.004)	(0.005)	(0.002)
RME	-0.79%	0.09%	-6.99%
Treatment=1	0.140*	-0.149**	0.009
	(0.078)	(0.078)	(0.015)
RME	49.16%	-21.11%	108.73%
(b) Previous Layoff			
Treatment =0	0.021***	-0.024***	0.003
	(0.008)	(0.009)	(0.003)
RME	45.16%	-2.57%	43.01%
Treatment =1	0.197*	-0.197*	0.000
	(0.101)	(0.106)	(0.077)
RME	93.68%	-25.15%	3.97%

Controls include log time, paternal and maternal age and education, maternal year of birth, family size, ethnicity, dummies for previous paternal layoff, maternal working pre-pregnancy and state education-specific female employment rate.

RME is relative marginal effect: relative to probability of being in state for average individual with layoff=0.

Table 6: Competing Risk Estimation of labor Market Entry by Maternity Leave Policy Control Group Sampling

	Change	(1)	(2)	(3)
		Return to Work	At Home with Child	Further Fertility
(a) Treatment =0	Drop if mother did not work pre-pregnancy	0.009	-0.001	0.000
		(0.009)	(0.009)	(0.002)
RME		11.66%	-1.08%	4.51%
(b) Treatment =0	Drop if mother did not work pre-pregnancy and child aged 3 months +	0.019	-0.016	-0.002
		(0.038)	(0.038)	(0.001)
RME		6.84%	-2.26%	-48.50%
(c) Treatment =0	Only in areas covered by FMLA but child aged 3 months + and mother worked pre-pregnancy	-0.018	0.021	-0.004
		(0.013)	(0.002)	(0.002)
		-31.31%	2.28%	-47.41%

Controls include log time, paternal and maternal age and education, maternal year of birth, family size, ethnicity, dummies for previous paternal layoff, maternal working pre-pregnancy and state education-specific female employment rate.

RME is relative marginal effect: relative to probability of being in state for average individual with layoff=0.

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