

NBER WORKING PAPER SERIES

HOW DOES JOB-PROTECTED MATERNITY LEAVE
AFFECT MOTHERS' EMPLOYMENT AND INFANT HEALTH?

Michael Baker

Kevin Milligan

Working Paper 11135

<http://www.nber.org/papers/w11135>

NATIONAL BUREAU OF ECONOMIC RESEARCH

1050 Massachusetts Avenue

Cambridge, MA 02138

February 2005

We thank Pierre Brochu, Ekaterina Chmatova, and Andrea Wenham for excellent research assistance and Louise Grogan and seminar participants at the Universities of British Columbia, Guelph, Toronto and at the NBER Summer Institute (2004) for comments. We also gratefully acknowledge the research support of SSHRC (Baker Grant #410-020-707, Milligan Grant #410-2002-0299). Milligan wishes to thank the NBER for hosting him while parts of the paper were written. Finally, we thank the staffs of the Toronto and B.C. Research Data Centres for their technical support. This paper represents the views of the authors and does not necessarily reflect the views of Statistics Canada. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

© 2005 by Michael Baker and Kevin Milligan. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

How Does Job-Protected Maternity Leave Affect Mothers' Employment and Infant Health?

Michael Baker and Kevin Milligan

NBER Working Paper No. 11135

February 2005

JEL No. J13, J32

ABSTRACT

Maternity leaves can affect mothers' and infants' welfare if they first affect the amount of time working women stay at home post birth. We provide new evidence of the labor supply effects of these leaves from an analysis of the introduction and expansion of job-protected maternity leave in Canada. The substantial variation in leave entitlements across mothers by time and space is likely exogenous to their unobserved characteristics. This is important because unobserved heterogeneity correlated with leave entitlement potentially biases many previous studies of this topic. We find that modest mandates of 17-18 weeks do not increase the time mothers spend at home. The physical demands of birth and private arrangements appear to render short mandates redundant. These mandates do, however, decrease the proportion of women quitting their jobs, increase leave taking, and increase the proportion returning to their pre-birth employers. In contrast, we find that expansions of job-protected leaves to lengths up to 70 weeks do increase the time spent at home (as well as leave-taking and job continuity). We also examine whether this increase in time at home affects infant health, finding no evidence of an effect on the incidence of low birth weight or infant mortality.

Michael Baker

Department of Economics

University of Toronto

150 St. George Street

Toronto, Ontario M5S 3G7 CANADA

and NBER

baker@chass.utoronto.ca

Kevin Milligan

Department of Economics

University of British Columbia

#997-1873 East Mall

Vancouver, B.C.

CANADA V6T 1Z1

and NBER

kevin.milligan@ubc.ca

I. Introduction

Job-protected maternity leave mandates are a common public policy directed to the welfare of infants and mothers. They vary considerably; universal, long and paid in Europe; targeted, short and unpaid in the United States. The recent trend in most jurisdictions is to more generous entitlements. The duration of leave has been lengthened in Europe and Canada. Led by California's Family Leave Insurance Program of 2004, many U.S. states are considering income replacement for the leaves provided under the 1993 Family and Medical Leave Act.¹

The benefits of the mandates for infants are thought to include better pre- and post-natal care, a longer period of breastfeeding, more intense parental bonding and lower accident rates in the first years. The potential benefits for mothers are better post partum physical and mental health, and improved long-run labor market outcomes due to increased employment continuity over the birth event. Waldfogel (1998b) argues that maternity leave is a key policy response to the "family gap" in earnings between women with and without children.² Based on available evidence, the World Health Organization (2000) concludes that "women need at least 16 weeks of absence from work after delivery" to protect the health of both mother and child.

These claims are based on research showing maternity leaves are positively associated with post-birth wages (for example, Shapiro and Mott 1994, Waldfogel 1998a), the employment of females in their childbearing years (for example, Ruhm 1998) and the mental health of mothers (Chatterji and Markowitz 2004). Leaves are also found to be negatively associated with infant mortality (e.g., Ruhm 2000). Other studies find that breastfeeding tends to end in the month the mother returns to work (Lindberg 1996).

¹ A summary of initiatives in 2004 can be found at <http://www.nationalpartnership.org/portals/p3/library/PaidLeave/StateRoundUp2004.pdf> (accessed December 2, 2004).

² Phipps, Burton, and Lethbridge (2001) provide evidence of the family gap for Canada.

While supportive, these findings must be interpreted with care. In some cases the inference may be biased by heterogeneity across mothers who are eligible for maternity leave and mothers who are not. In addition, much of this evidence suffers from a “causality gap”: the positive outcomes attributed to maternity leaves rest on first stage relationships between the mandates and mothers’ labor supply decisions that are theoretically ambiguous, and also empirically ambiguous in previous research.

There are two key questions. First, how do leave mandates affect the average length of time mothers spend at home with their newborns? This is the necessary first stage to any effect of leaves on infants’ or mothers’ health and welfare. Second, how do leaves affect the proportion of mothers who return to employment with the pre-birth employer? This is the necessary first stage to any effect of leaves on females’ long run labor market outcomes.

The importance of answers to these questions is accentuated by growing recognition that the first years of life are crucial to child development, which in turn is important to adult success. Furthermore, if leave mandates cause working females to stay home longer with their babies, they can serve as an instrument for maternal employment in a child’s first year. Therefore, there is also a link from these leaves to the important literature on maternal employment and child development.

Our contribution in this paper is twofold. First, we provide new evidence of the effect of leave mandates on maternal labor supply. The results offer clear answers to our two questions, and fill in the gap between the mandates and the benefits they are thought to provide. Second, we relate our evidence on the amount of time mothers are at home with their infants to infant mortality rates. This is the link that is missing in previous studies of the relationship between leave mandates and mortality rates.

Our inference is based on Canadian maternity leave mandates. In Canada, job-protected

leave mandates are under provincial rather than federal jurisdiction for most workers. Mothers' leave eligibility varies by time and space rather than by their choices to match with particular employers, and is therefore less likely correlated with their unobserved characteristics. Over our sample period we observe the introduction of modest mandates (17-18 weeks) in several provinces, followed by widespread expansions of leaves to 29-70 weeks.

These policy episodes provide an attractive basis for inference. Exploiting provincial differences in mandates and sharp discontinuities across time, we offer clear, graphical motivation for our main estimation results. The wide range of mandates observed provides perspective on both the short leaves of the FMLA and the longer leaves available in other countries.

Some of these benefits are manifest in figure 1, where we graph the proportions of married females with a child aged less than one who are employed, employed and on leave and employed and at work over the sample period.³ Overall employment displays the well known positive trend over the period. Its components, however, display very different patterns. The vertical lines mark two reforms that increased the amount of leave available to mothers. Each is associated with an increase in the proportion of mothers on leave and decrease in the proportion at work; most dramatically the reform in 2000. This provides some prima facie evidence of a relationship between leaves and the time mothers stay at home after birth.

We offer three primary conclusions. First, the introduction of modest mandates increases the proportion of mothers employed and on leave and their job continuity with the pre-birth employer, but has little effect on the length of time they are at home with their infants. Second, in contrast to the shorter leaves, mandate extensions significantly increase the period mothers are at home post birth, and also increase job continuity over the birth event. Finally, our results

³ This graph is based on Labor Force Survey data described in Section 5.

indicate that these mandates have no effect on infant health as measured by infant mortality rates and the incidence of low birth weight.

2. Theory

Klerman and Leibowitz (1997) explore the labor supply effects of maternity leaves in a static framework. With no mandate, employers may voluntarily offer an unpaid (or paid) maternity leave. This is a result of private incentives to preserve good employee matches and job-specific human capital. Females choose between this leave and severing the employment relationship to be at home with their child for a longer period. The cost of quitting is the difference between the current wage and the alternative wage. Females make an optimal choice given a reservation wage that declines with each month after giving birth.

A leave mandate that exceeds the employer's voluntary offer will lead some females who previously would have quit their jobs to remain employed and take the mandated leave. Also, some females who had previously taken the shorter leave offered by the employer will now take the additional weeks allowed under the mandate. Therefore the mandate will reduce the number of women quitting their jobs pre-birth to spend time at home, and clearly increase the number of women who are employed and on leave over the birth event. The model has no definitive prediction, however, for the average amount of time women are at home with their child. Some females take longer leaves under the mandate but others take shorter leaves.

Because our analysis focuses on labor market decisions in specific months around the month of birth (MOB), it is useful to parse this last prediction from a monthly perspective. Women not at home with their child are employed and at work. In months covered both by the employer's voluntary offer and the leave mandate (e.g., the MOB), there should be no change in the proportion employed and at work, as the mandate simply duplicates the pre-existing private arrangement. In months the mandate exceeds the voluntary offer the proportion employed and at

work should fall. For example, if the voluntary offer is six weeks and the mandate 12 weeks, assuming all leaves start at the point of birth the proportion employed and at work should fall in weeks 7 through 12. Finally, in weeks beyond the mandate the proportion employed and at work may rise if the mandate encourages those who previously quit their jobs to take leave.

Leave mandates may also affect women's wages. There are two viewpoints. The first is provided by Summers' (1989) analysis of mandated benefits. Mandated benefits act like a tax on the labor of the eligible group, decreasing their wages (received) and employment.⁴ Because leave mandates increase the cost of employing females in their child bearing years, they should lower the wages and employment of this group.⁵ The second is an informal argument that mandates increase job continuity across the birth event so females with children end up with higher levels of job specific human capital and are able to remain in good matches. In the long run this should improve this group's economic stature. Waldfogel (1998b) argues these effects are important to improving the circumstances of mothers.

3. Previous Evidence on Maternity Leaves

Most previous studies of maternity leaves and the labor market are based on U.S. data. The message of this research is mixed, but the variation of leave entitlement across mothers in the U.S. may not provide an ideal forum for this analysis. Historically the provision of leave was voluntary.⁶ Inference from this period is potentially biased by unobserved differences between mothers who had access to maternity leave and those that didn't. More recently the FMLA (and miscellaneous state-specific initiatives) mandates leave, but only for employers with 50 or more employees. Waldfogel (1999) estimates more than one-half of private sector workers are

⁴ In the special case where employees' valuation of the benefit matches employers' costs, employment is unchanged and the full incidence of the tax falls on wages.

⁵ Gruber (1994) uses this framework to investigate the effects of the U.S. Pregnancy Discrimination Act of 1979. He finds that the main (negative) effect of the Act was on the wages of females in their childbearing years.

⁶ A qualification is the Pregnancy Discrimination Act of 1979 by which firms had to treat pregnancy like any other illness in their health plans.

uncovered. This means the law affects those who are most likely to have access to leave through their large employers, and presents the possibility that females sort across firms of different sizes based on their preferences for work around birth.

Studies of the relationship between the FMLA (or state specific initiatives that preceded it) and the employment status of new mothers, or the wages of females in their child bearing years, often report no effect or estimates that are sensitive to specification (e.g., Baum 2003b, Klerman and Leibowitz 1997, Waldfogel 1999). An exception is Waldfogel (1999) who finds that the FMLA did increase the proportion of women with a child aged less than one who were employed and on leave, but had no effect on overall employment. Studies of the effect of leave on job continuity are a little more optimistic. Waldfogel (1998a) and Waldfogel et al (1999) show that females who have access to maternity leave are more likely to return to their pre-birth employer. The latter study reports that 64.3 percent of new mothers who have access to leave returned to the same employer after childbirth compared to only 42.6 percent of those reporting no access. Baum (2003a) finds that the FMLA increased the proportion of mothers returning to their pre-birth job, but his samples are small and the effects vary in statistical significance and are sensitive to model specification.

Klerman and Leibowitz provide perspective on the job continuity results. Klerman and Leibowitz (1994) show that in the pre-FMLA era the vast majority of females who work within their child's first year of life remain employed (although on leave) over the birth event. Klerman and Leibowitz (1999) provide direct evidence (from the NLSY) that, pre-FMLA, 60 percent of females working full time before the birth of their child returned to the same employer post-birth. This high percentage leaves limited scope for leave mandates to increase job retention unless

they lead to a substantial increase in the incidence of leave.⁷

Studies based on European data provide more decisive inference, although many do not directly examine the relationship between leave mandates and mothers' labor supply. There is evidence that access to leave increases job continuity (Waldfogel et al. 1999). Also, that leave mandates increase the employment of females in their childbearing years (Winegarden and Bracy 1995 and Ruhm 1998) but decrease their relative wages at extended durations (Ruhm 1998). Why mandates have these effects remains an open question. Ruhm notes the employment effects could result from 1) higher proportions of mothers remaining employed over the birth event, 2) greater labor participation of childless females to qualify for leave benefits when they have kids, and/or 3) new mothers returning to work sooner.

ten Cate (2000 and 2003) studies the effect of the same Canadian leave mandates studied here, but focuses only on employment rates over a broad post-birth period. She reports they increased the relative employment rate of females with children aged 0-2, and increased the probability of returning to work within two years of birth.⁸

Few studies have examined the relationship between maternity leaves and health. There is evidence that European leave mandates decreased infant mortality (Winegarden and Bracy 1995 and Ruhm 2000). The primary effect is in the post-neonatal period, the result of mandates in excess of 30 weeks. Research on maternal health suggests longer leaves positively affect the mental health, vitality and role function of mothers (McGovern et al. 1997) and reduce depressive symptoms, although not the incidence of clinical depression (Chatterji and Markowitz 2004).⁹

⁷ Significantly, Baum (2003a) reports no effect of the FMLA and state specific mandates on the incidence of leave.

⁸ Phipps (2000) looks at the incentive effects of paid maternity leave through the unemployment insurance system on fertility and hours worked, finding no evidence of changed behavior.

⁹ Lero (2003) provides a summary and references to some additional studies of maternal health after childbirth.

4. Maternity Leave Mandates in Canada

Maternity leave defined as a right to return to a pre-birth job after a specified period is established by provincial labor standards legislation (or federal labor standards legislation for employment in the federal public sector or federally regulated industries). British Columbia was the leader, prohibiting the employment of women for 6 weeks following childbirth through the Maternity Protection Act of 1921. New Brunswick was next to act in the 1960s, and the last province to introduce a mandate was Prince Edward Island (P.E.I.) in 1982.

The legislation has several common features across provinces. First, employees are protected from dismissal due to pregnancy. Second, a maximum period for the leave is always prescribed and the leave is specified as unpaid. Initially the laws of several provinces provided guidance to how the period of leave should be split pre- and post-birth, but current practice is to leave this to the discretion of the mother and employer. Third, the laws specify a minimum period of employment for eligibility. This varies widely: initially 52 weeks of employment was common, although British Columbia effectively had no requirement. The recent trend is to shorter qualification periods. Fourth, most laws specify which terms of employment are preserved during the leave and any responsibility of the employer to maintain benefits. Finally, the laws of some provinces establish rules for extending leaves due to medical complications or pregnancies that continue after term.

The maximum leave provisions of the federal jurisdiction and the provinces in the years 1963 through 2002 are listed in table 1. This same information is graphed in figure 2. In the 1960s, 1970s and early 1980s, the provinces introduced mandates at different points in time. By the mid 1980s all provinces mandated 17 or 18 weeks of leave.¹⁰ The next major innovation was

¹⁰ It is possible that this policy variation followed the entry of women into the labor market in different provinces. To test this policy endogeneity hypothesis, we regressed the policy variables on lagged province-year cells of female

in 1990/91 following a change in the treatment of maternity leave under the Unemployment Insurance (UI) Act. Eight of ten provinces increased their mandates to between 29 and 52 weeks, six of them moving within a six month period. This change was actually the introduction of a parental leave of between 12 and 34 weeks in addition to the existing maternity leave. In most provinces the additional leave could be taken by either the father or mother, although in practice the vast majority of these leaves are taken by the mother.¹¹ The final reform is the extension of parental leave at the end of 2000, which brought the total amount of leave available in all provinces to at least 52 weeks. Again this change was induced by a reform of the (now renamed) Employment Insurance (EI) Act, and seven of ten provinces changed their mandates simultaneously. Quebec had already extended its mandate in excess of one year in 1997, while British Columbia and Saskatchewan did not change their mandates until early 2001. Note that the early reforms in figure 2 are staggered through time, while the later reforms are clustered in short time-spans. We accommodate these different patterns of variation in our analysis.

While provincial standards provide unpaid maternity leaves, leave benefits are available to some mothers through the EI system. EI in Canada provides protection for “earnings interruptions” from a variety of sources. Starting in 1971, the eligible sources were expanded to include interruptions due to birth. Our analysis of labor supply starts in 1976, so leaves were compensated for some mothers over our sample period.

In the absence of a job-protected leave mandate, the availability of maternity benefits may alter the voluntary leaves offered by employers. This is because the availability of benefits will increase mothers’ reservation wages. Within the context of the Klerman/Leibowitz model,

labor force participation. Using lags of 1 to 10 years, we find that previous labor market participation is a poor predictor of policy values, with coefficients that are both economically and statistically insignificant.

¹¹ Most provincial laws stipulate that the parental leave must be completed within a set period post-birth (e.g., 52 weeks) and must be taken immediately following any maternity leave.

this will lower the proportion of females choosing the voluntary leave rather than quitting. In response, employers may lengthen their offered leave to retain attractive employees.

In table 2 we present some features of the EI maternity leave program for the period 1971-2000. In the first column is the maximum duration of benefits available to mothers with sufficient employment in the qualifying period.¹² Benefits are proportional to insurable earnings to a cap set roughly at the average wage (column 2). This proportion, the statutory replacement rate, is presented in column 3. Finally, benefits are available after a two week waiting period so the “effective” replacement rate is somewhat lower. In the third column we present the effective replacement rate assuming the individual takes the maximum period of leave. Over our sample period (1976+), females taking the maximum leave and earning less than the average wage could expect to receive 50 to 55 percent of their pre-birth compensation.¹³

The maternity leave provisions of the EI system do not provide (or require) a right of return to pre-leave employment. Therefore, females planning to leave the labor force with the birth of their child can be eligible to collect EI benefits. Also, the EI eligibility provisions do not demand the qualifying period of employment be with a single employer. It is possible that a woman could qualify for leave under her provincial standards but fail to qualify for EI benefits during the leave, and vice versa.

5. The Data

Labor Supply

The analysis of mothers’ labor supply is based on data from the master files of the Labor

¹² Initially qualification for benefits required 20 weeks employment in the previous year with earnings greater than 20 percent of maximum weekly insurable earnings in each week, but since 1996 qualification has been based on hours of work. Also, in the 1970s the “magic 10” rule restricted benefits to individuals who could show that 10 of the 20 insurable weeks were from the 20 week period between the 31st and 50th weeks before the expected date of birth. This rule, eliminated in 1984, denied benefits to females who entered the labor force after conception.

¹³ Until 2000 benefits were taxed back at a 30% rate for beneficiaries whose annual income exceeded 1.5 times maximum insurable earnings.

Force Survey (LFS). The LFS is a monthly survey designed to provide timely information on Canadians' labor market activity. The data are collected at the individual level, but it is possible to aggregate individuals into families, and associate families with physical dwellings. The survey has a rotating panel design. Individuals belong to a rotation group that is interviewed for six consecutive months. The entrance of rotation groups is staggered so that in any month six groups are interviewed, with one group entering and another group leaving. The survey covers individuals living in the ten provinces, excluding those on Indian Reserves, full-time members of the Armed Forces and inmates of institutions. Information is collected on current labor market status, demographics, job search activities and job characteristics. The microdata are available starting in January 1976.

We create two samples from these data. The first takes advantage of the panel structure of the survey to identify females who experience a birth and to examine their labor market activity in the surrounding period. All adult records include variables reporting the number of own children living at home by the single ages 0 through 24. We identify births through increments in the number of own children less than one year of age between the first and second, second and third, ..., fifth and sixth months of a rotation.¹⁴ The month this variable changes is denoted the "month of birth". Assuming a uniform distribution of births within a given month period, the survey information for the MOB is collected when the newborn is two weeks old on average. Depending on when the birth occurs we can observe labor market status up to four months preceding or following the birth. For example, if the birth occurs between the first and second month of the rotation, we observe labor market activity in the month before the MOB and

¹⁴ The strategy of identifying births only works for years prior to 1996 when demographic information for other children was collected once in the first month of interview. Starting 1996, this demographic information is updated monthly. Therefore, a change in the number of children less than one could result from a child having his/her first birthday.

in the four months following. If the birth occurs between the fifth and sixth months, we observe up to four months before the MOB, but no months following.

We next form samples with monthly observations on labor supply for particular months over the birth event. For example, one sample contains monthly observations for the MOB, while another contains the observations for one month after birth. Because births occurring in a given month will come from different rotation groups, women will be captured at different points in the rotation. This means we capture pre- and post-birth labor supply for subsets of the mothers having births in any given calendar month. For example, we observe labor market status three months prior to birth for only for a subset of the women who give birth in March 1985. This is because some of these mothers entered the survey in February (or January), one (two) month(s) prior to birth.

The second sample we create is a time series of cross sections (TSCS). We draw observations from the April and October surveys of each year.¹⁵ Our target group is females with a child aged less than one. The advantages of this sample are that we have much larger sample sizes and that we capture women up to 12 months past the birth month, providing a broader view of any changes in leave incidence and time spent at home.

We focus on “married” (married or cohabitating) adult (aged 20-39) females. An initial analysis revealed that unmarried mothers respond differently to leave mandates, but the number of these women is too small in our data to conduct a full analysis. We also exclude births to married teenage mothers. Our reasoning is that this group often has stronger family ties, and so may make different decisions than older females whom we expect are more independent. Again sample sizes are too small to allow a separate analysis of teenagers.

Infant Health

¹⁵ The choice of months 6 months apart ensures no rotation group appears twice in the data

We measure infant health using annual vital statistics data on perinatal and infant mortality and the proportion of low weight births, by province, for 1961-2002. A description of these data and the control variables used in this analysis is provided in the appendix. Information on more subtle measures of infant health and development is not yet available.¹⁶

6. Empirical Framework

Labor Supply

We use a variety of empirical strategies to accommodate the different types of mandate variation we observe over the sample period (see figure 2). We begin investigating the introduction of 17-18 week mandates in Alberta, Newfoundland, Prince Edward Island and Quebec and the mandate extensions from 12 to 18 weeks in British Columbia and New Brunswick. The analysis uses data from January 1976 through October 1990. The base estimating equation, for either our panel-based or TSCS samples, is

$$y_{ipt} = \alpha \cdot WKS LV_{pt} + X_{ipt} \beta + \varepsilon_{ipt} \quad (1)$$

where i indexes individuals, p provinces and t months. $WKS LV$ is weeks of mandated job-protected maternity leave. For the panel-based sample we code this variable using the statute in effect in the month preceding the MOB. For the TSCS sample we experiment coding $WKS LV$ either using the statute effective in the current month or a lagged statute. Since our sample is mothers with children aged less than one, the current statute will only be “correct”¹⁷ for those who gave birth very recently. By lagging the statute we ensure correct coding for mothers with less recent births to discover if our results are sensitive on this margin.

The X_{ipt} are control variables: province effects, year effects, calendar month effects, a cubic in age, education (three categories) and a control for any other children aged 1-24. For

¹⁶ Detailed data covering the most recent expansions will soon be available, so we leave study of other health measures to future work

¹⁷ If the mandate has not changed recently, the coding will also be correct for mothers with less recent births.

specifications in which we add additional control groups, we include second order interactions of province, year, and a mother dummy.

Our dependent variables are 0/1 indicators that the individual is “employed and at work” or “employed and on leave”. For our panel-based data we define these variables for the MOB and for the first and second months preceding, and first through third months following, the MOB.¹⁸ In our TSCS data they are defined for the month of observation, and record labor market status over the one year period following the date of birth.

For the panel-based data we also create indicators of pre/post birth job continuity. First are 0/1 indicators that the individual left a job, or left a job for personal reasons, in the 12 months preceding the MOB. Second is a 0/1 indicator that the individual is employed in the third month following the MOB and has job tenure of three months or longer. This variable is intended to capture the proportion of mothers who are employed post-birth with their pre-birth employer. This interpretation is problematic if individuals who quit their jobs pre-birth, but eventually return to their pre-birth employer, report their tenure post-birth as starting at the time of return to their job. In the appendix we investigate this issue and present evidence that individuals interpret the tenure question to ask when they initially started work with their current employer, not when the current employment period with the employer started. More detail on dependent and explanatory variables is also provided in the appendix.

Equation (1) is estimated by ordinary least-squares (OLS). Standard errors are corrected for heteroskedasticity and, following the guidance in Hansen (2004), calculated clustering on province to account for serial correlation within province.¹⁹ We also estimate variants of (1)

¹⁸ While we can also construct a measure of employment for the fourth month following birth, many of the province/year cells for this variable are empty over the period that the mandates were introduced (1976-1982).

¹⁹ Hansen reports that this method produces tests of approximately correct size, but of less power than tests based on feasible GLS. The standard errors calculated this way are mostly marginally larger than the estimates calculated

which add province-specific linear trends, or add married males aged 20-39 or married childless females aged 20-39 to the sample. In the latter case, we add a full set of interactions between 0/1 indicators that the individual is female or a mom and all the other explanatory variables.

We also investigate the introduction of parental leave in 1990-92, and the extension of parental leave in 2000-2001. In table 3 we present the dates of these reforms by province. Because in both cases many provinces moved almost simultaneously, a conventional cross-section time-series identification strategy is not effective. We therefore use a framework that compares variables of interest immediately before and after the reforms were implemented, using a variety of strategies to control for secular trends.

The estimating equation is

$$y_{ipt} = \alpha \cdot POST_{pt} + X_{ipt}\beta + \varepsilon_{ipt} \quad (2)$$

where $POST$ is a 0/1 indicator that the province's leave mandate has been extended. It captures the average effect of these mandate extensions. The dependent variables are the same as in (1) with the addition of employment status captured in the fourth month following the MOB. The additional explanatory variables are the same as in (1) with the exception of the year effects. Because there is little temporal variation in $POST$ across provinces, year effects will absorb all the variation in the dependent variable due to the mandate reforms. We approach this problem in two ways. In the first we exclude any controls for time, but limit the data to the period immediately surrounding the reforms. For the 1990 introduction of parental leave we use the samples January 1990 through December 1991 and July 1989 through December 1992. For the 2000 extension of parental leave we use the samples January 2000 through December 2001 and

clustering on province/year to account for the fact $WKSIV$ only varies by province and time. This might be expected, as estimates of the 1st, 2nd and 3rd order autocorrelations, making approximate adjustment for the fixed effects bias (Solon 1984), are generally quite small. Cases in which the estimated standard errors are smaller than those clustering on province/year are noted below.

July 1999 through December 2002. In the second approach we use a longer time period and add a polynomial in time. This amounts to a regression discontinuity design, where the discontinuity in leave entitlement occurs in the months reported in table 3. In either approach we also estimate (2) adding married males or married childless females as additional controls for secular trends.²⁰

Infant Health

Our analysis of infant health is based on annual data for the period 1961-2001. The estimating equation is

$$y_{pt} = \alpha \cdot WKS_{pt} + X_{pt} \beta + \varepsilon_{pt} \quad (3)$$

where p indexes provinces and t indexes years. The explanatory variables follow Ruhm (2000) and include province and year effects, the employment population ratio of females aged 15+, the fertility rate defined as the ratio of annual births to the female population aged 15 to 44, real provincial GDP per capita and total provincial health expenditures as a percent of GDP. The dependent variables are the perinatal, neonatal, post-neonatal and infant mortality rates and the proportion of births that are low birth weight (<2500 grams). Again a more detailed description of these variables is available in the appendix. We estimate (3) by OLS and calculate the standard errors correcting for heteroskedasticity and clustering on province. We also estimate variants of (3) that add province-specific linear or quadratic trends.

7. The Results~Labor Supply

In table 4 we present descriptive statistics of the labor supply variables from the panel-based sample for the period 1976-2003. The proportion of mothers employed and on leave peaks in the MOB at 42 percent, and then declines to 27 percent by the fourth month following. The

²⁰ In this case we calculate the standard errors correcting for heteroskedasticity and random effects at the province/year level. Given the short temporal dimension of the sample we do not expect serial correlation to be a problem. Calculating the standard errors clustering only on province leads to substantially smaller standard errors than the ones reported.

proportion employed and at work is very low in the MOB and two months following, at ten percent or less. Note that the complement of being employed and at work variable is being at home, whether it be not in the labor force, unemployed or employed on leave.

In the second panel we present some measures of job continuity. While in the regression analysis we use unconditional measures, here we present the proportion of mothers working three or four months after the MOB with tenure greater than three or four months conditional on employment. Viewed this way, Klerman and Leibowitz's (1994, 1999) point is clear – the vast majority of mothers working at this time have returned to their pre-birth employer.

The Introduction of Mandated Leave: the 1976-1990 Sample

While equation (1) compares provinces changing their mandates to all other provinces, in figure 3 we present an Ontario/Quebec comparison to motivate our identification strategy. These adjacent provinces are of similar size and economic structure. We focus on the month before birth, because in the months other than the MOB the mandate is less likely to duplicate private arrangements. The statistic reported is the (annual) proportion of mothers on leave. Ontario has a mandate of 17 weeks throughout the sample period while Quebec introduces a mandate of 18 weeks in 1978 (indicated by the vertical line). Prior to the Quebec reform the proportions in the two provinces are very similar. Starting the year of the reform, the proportion in Quebec begins a steeper trajectory and a substantial Quebec/Ontario gap emerges.

In the first panel of table 5 we present estimates of the effect of *WKSLV* on the proportion employed and on leave in the months surrounding birth. Guided by the 1985 Maternity Leave Survey we focus on the period two months before the MOB through three months following.²¹ In this survey, which was conducted after leave mandates were enacted in all provinces, maternity

²¹ The Maternity Leave Survey was an addendum to the February 1985 LFS, investigating the circumstances of maternity leaves among females whose last absence from work or last two absences (of two weeks or more) from work included one due to pregnancy.

leaves started six weeks before birth on average, four weeks at the median.²²

The first column results indicate some statistically significant impacts in the months preceding the MOB. The smaller and statistically insignificant estimates for the MOB and three months following are plausible if the mandates duplicated existing private arrangements.

In the second column we add linear provincial trends. There are strong secular trends in mothers' labor supply over the period (figure 1), and some part of it likely has a provincial characteristic. The estimate in the second month preceding the MOB is now small and statistically insignificant. We now also see statistically significant effects in all the other months surrounding birth, which imply economically significant increases in the proportion on leave. To calibrate, we use averages of the dependent variables in the provinces that introduced mandates, over the years there was no mandate in place.²³ In the MOB, the estimate of 0.0031 per week implies that an 18 week mandate leads to a 5.5 percentage point increase in this proportion off a pre-mandate base of 18 percent. In the third month following birth the effect is nine points off a base of six percent.

In column 3 we address the problem of workers in the federal sector who have a different leave mandate (see table 1). The federal sector covers federal public administration and industries such as banking, and some parts of the transportation and communication sectors. Workers in this sector represent four to five percent of employment at the aggregate level. Industrial codes in the LFS (4-digit NAICS) do not allow us to uniquely identify these workers. Therefore, we delete all individuals who, as of the MOB, had current or previous (last 12 months) employment in a 4-digit industry that contained federal workers. The resulting estimates are marginally larger than in column 2, although the differences are not statistically

²² Recall that in the MOB newborns are two weeks old on average.

²³ We use 1976-June 1978 data for Newfoundland, PEI and Quebec, and 1976 data for Alberta.

significant.

Given that many women were not employed pre-birth or were self-employed, our sample includes women who were not eligible for leave. To isolate individuals who are eligible to take leave we exclude anyone who as of the MOB had not worked in the previous year in paid employment (the LFS does not have enough work history information to implement the province-specific employment requirements). The result, as expected, is larger estimates (column 4). In the months following the MOB an 18 week mandate raises the proportion of these mothers on leave between 10 and 14 percentage points. Again, these results are economically significant.

In the last two columns we add, sequentially, married males or childless females to the sample as an additional control for province-specific trends. If the mandates had no independent effect on these control groups we would expect the results to be similar to those in column 2. This is exactly what we find when adding males (column 5), and to a lesser extent when adding childless females. Certainly these experiments do not overturn our original inference.

The second panel of table 5 contains results for the proportion employed and at work. Here, the full sample of mothers (that is, not conditional on work in the past 12 months) is of particular interest, because we wish to discover whether the mandates increase time spent at home. The specifications and samples vary across columns as in the upper panel. The estimates provide little evidence that the mandates decreased work in the period surrounding birth. Most are uniformly small and statistically insignificant. The exception is when we restrict the sample to mothers with recent (paid) employment. Here some of the estimates approach economic, although not statistical, significance. There are also some positive and significant estimates in the second month preceding the MOB, but statistical significance in this case is sensitive to the

method for calculating the standard errors.²⁴

In table 6 we present estimates of the effect of the mandates on job continuity. The dependent variable in the first row is the proportion of females employed in the third month after birth with current tenure greater than three months. Conditional on province specific trends, the estimates for *WKSLV* are all positive and mostly statistically significant.²⁵ In the second column, an 18 week mandate is estimated to raise the proportion by about 6 percentage points off a pre-mandate base of 21 percent.

There is a consistently statistically significant negative effect on the proportion leaving a job within the 12 months preceding birth, and it is driven by exits for personal or family reasons. In the second column, an 18 week mandate lowers the proportion by roughly 5.5 percentage points (off a pre-mandate base of 35 percent). Note that this estimate roughly matches both the increase in the proportion of these women employed at 3 months after the MOB with their pre birth employer, and the increase in the proportion employed and on leave for this specification from the first panel. The estimated change is ten percentage points for the sample who worked in the 12 months preceding birth, which is perhaps the more appropriate sample since those who were not working have no job to leave.

In table 7 we present estimates from the TSCS sample. This exercise cross validates our panel inference and provides better perspective on the average amount of time mothers are at home with their infants. Because the sample contains mothers up to a year post birth, it captures both those who might take longer leaves as a result of the mandate, and those that might take shorter leaves. The results are consistent with the estimates from the panel data. First, there is evidence of an effect on the proportion of mothers employed and on leave: an 18 week mandate

²⁴ In this case clustering on province produces substantially smaller standard errors than clustering on province/year.

²⁵ If the standard errors are calculated clustering on province/year, most estimates are at most marginally significant.

raises the proportion 2.5 percentage points (column 2). Second, estimates for the proportion employed and at work are mostly small and uniformly statistically insignificant. This indicates no change on average in the period mothers are at home in the first year. We present results coding *WKS LV* to current and three month lagged mandates, the latter matching the mandate to mothers with three month old children. The estimates are not sensitive on this margin.

These results provide strong and robust evidence that the introduction and initial expansions of leave mandates in the 1970s and 1980s led to increased leave taking. However, we find no consistent evidence that women switched to leaves from being employed and at work. Instead, the evidence suggests that women staying at home with their child switched from leaving their jobs to taking leave. Importantly, this finding provides no basis to expect any consequent change in the infants' or the mothers' health, since time at home does not change. We also find a sharp decrease in job separations, which is accompanied with an increase in retention of the pre-birth job. This indicates that the introduction of leave can help females preserve job specific human capital over the birth event.

An Extension of Mandated Leave: the 1990 Introduction of Parental Leave

The introduction of parental leave starting in 1990 increased the amount of job-protected leave available to new mothers from 17-18 weeks to 29-52 weeks. To motivate our results, in figures 4 and 5 we present semi-annual estimates of the proportion of mothers employed and on leave in the provinces of British Columbia, New Brunswick, Prince Edward Island and Quebec between 1985 and 1996. These four provinces introduced parental leave over the first six months of 1991, which is indicated by a vertical line in each graph. While there is a definite upward trend in the proportion employed and on leave in the MOB (figure 4) over the period, there is at best subtle evidence of a break in the first half of 1991. In contrast, the graph for the fourth month following the MOB (figure 5) displays an obvious upward shift starting in 1991.

In table 8 we report estimates of *POST* from equation (2) for the proportions employed and on leave and at work. Given the results in table 5, we focus on months in which mandated leave was most likely unavailable before the extension: two months before the MOB and three and four months following. The results in the first column are from data for 1990 and 1991. There is strong evidence of an increase in leave and offsetting decrease in work at four months after birth. The estimates indicate offsetting changes of more than ten percentage points. In the other months the results are mixed. There is evidence of smaller decreases in work, and small and statistically insignificant changes in the proportion employed and on leave.

In the next column the sample is July 1989 through December 1992. This picks up the reform in Newfoundland and provides longer periods to establish the pre- and post-reform levels. There are significant increases in leave in both the third and fourth months following birth and offsetting decreases in work. There is also a very modest decrease in work in the MOB.

To calibrate the results we use the averages of the dependent variables in all provinces in the period just before the reform: July 1989-October 1990. The 15.6 percentage point increase in leave in the fourth month following birth (column 2) is off a pre-reform base of 21 percent. The 12.6 percentage point decrease in the proportion at work is off a base of 30 percent. These are large effects, indicating a large increase in the proportion of women at home with their children.

In the third column we check for spurious inference. Using data from July 1986 through 1989 we code the changes in the provincial mandates subtracting three years from each date of enactment. This falsification exercise should provide evidence of the sensitivity of the identification strategy to secular trends. The estimates are almost uniformly small and statistically insignificant, the exception being some effect in the second month before the MOB.

In the remaining four columns are the results when we delete the federal sector, focus on those who had a paid job within 12 months of the MOB, and when we add males or childless

females as an additional control. The estimates confirm the conclusions from column 2. Some notable differences are a much larger effect in the third month following the MOB when we focus on those with recent employment, and the statistical insignificance of some estimates for employed and at work when we add males or childless females to the sample. The latter result is likely a consequence of the 1990/92 recession, an issue we take up below.

In table 9 are the results for our measures of job continuity. They indicate significant increases in the proportion of mothers employed with their pre-birth employer in the fourth month following birth. The nine percentage point increase in column 2 can be compared to a pre-reform base of 41 percent. There is also a statistically significant, although modest, decrease in the proportion leaving a job in the 12 months preceding the MOB for family reasons.

As explained in Section 2, the expected source of increased job continuity is females, who previously would have quit their job and taken long periods off, now taking the mandated leave and remaining with their employers. If this were the only effect at work, we would expect strong evidence of a decline in the proportion quitting their last job, a corresponding increase in the proportion employed and on leave in the MOB and the change in overall employment at MOB+4 to equal the change in employment at MOB+4 with tenure greater than 4 months. The estimates for the quit rate (table 9) and the proportion on leave in the MOB (table 8) are equally modest, however, and the estimates in table 8 show that the change in overall employment at MOB+4 is relatively small because the increase in the proportion on leave is almost offset by the change in the proportion at work.

To be concrete, consider the estimated increase in job continuity at four months after birth from column 2 of table 9: 9.11 percentage points. This is repeated in the first row of table 10. The increase in overall employment at four months from this specification is the sum (table 8) of a 15.6 point increase in the proportion employed and on leave and a 12.6 point decrease in

the proportion employed and at work. The net effect is almost +3 percentage points. We provide a direct estimate in the second row of table 10. Therefore, the change in overall employment is not consistent with the increase in job continuity being solely more females taking the mandated leave. The missing detail is provided in the third through sixth rows. The increase in job continuity is associated with a substantial decrease in employment with tenure less than five months. The estimates indicate that a strong plurality of the shift in the distribution of tenure is a reduction in employment with tenure equal to two months.

An explanation of the decrease in employment at tenures less than five months is that females who previously quit their job and returned to work shortly after the MOB are now taking the longer leave provided by mandate. Therefore, the introduction of parental leave caused a shift of employment from tenures under five months to longer tenures. This might occur if these mothers preferred a gradual return to the labor market after birth to immediate full time employment, but could not negotiate this arrangement with their employer. The introduction of parental leave allows them to put off full time employment to a more acceptable time. Consistent with this story, almost two-thirds of the 6.1 point decline in employment at tenures less than five months is in part time work. The estimated change in part time work at these tenures is -0.03921 with a standard error of 0.0128. This would explain why we do not find a large impact on the job leaving rate.

In table 11 we present the results using the TSCS sample. Here we code the mandate in the current month or a six month lag. There is consistent evidence of a four to six percentage point increase in the proportion employed and on leave. There is also fairly consistent evidence of a corresponding decline in the proportion employed and at work. Therefore, if the mandate extension led some women to spend less time at home, this effect is more than offset at the average by women who increased their time at home. The exception to this conclusion occurs

when we add males or childless females as a control group. The source of this discrepancy, also seen in the estimates for MOB+3 in table 8, is seen in figure 6. The 1990-92 recession had a differential impact on the overall employment of these different groups. Males and childless females experienced declines in both work and in overall employment (these categories are effectively the same for these two groups). While the mothers experienced a decline in work (figure 1), their overall employment held steady. Therefore, while the reductions in work for males or childless females net out the reduction in work for mothers in these estimates, the former is likely a recession effect while the latter is likely a mandate effect.

As a further check on inference we have re-estimated our models for both the panel-based and TSCS samples using another identification strategy. We add a polynomial in time to equation (2) and expand the sample to 1988-1994. This is like a regression discontinuity design in which all effects of time, except the mandate reforms, are assumed to be smooth functions. For the panel-based data these estimated effects are very similar for the fourth month following the MOB, but generally smaller for other months. For the TSCS data the results indicate a two to three percentage point increase in the proportion on leave, and a modestly smaller decrease in the proportion at work. In either case the results are very robust to specification of the time effects as linear, a quadratic or a cubic. These results are available from the authors on request.

An Extension of Mandated Leave: the 2000 Extension of Parental Leave

As indicated in table 3, the extension of parental leave starting in 2000 raised the amount of leave available to one year in all provinces except Quebec, where leave had been extended to 70 weeks in 1997. The motivation for our inference is clear in figure 1. In 2001 we see a dramatic increase in the proportion of mothers with a child aged less who are employed and on leave, and an offsetting decrease in the proportion employed and at work.

The extension of leave from roughly six to twelve months in most provinces is outside

the span of observation of our panel-based data, which only extend to four months after the MOB. We therefore focus on our TSCS sample. Estimates of the proportion of mothers with a child aged less than one on leave or at work are presented in table 12. The progression of samples and specifications is the same as in table 11. In the first panel there is very strong evidence of roughly a 9 percentage point increase in the proportion on leave and a 10-11 point decrease in the proportion at work. The results are uniformly larger in the second panel when we lag the coding of the mandate by 9 months. The estimated increase in leave is 12-13 percentage points and the estimated decrease in work is 12-14 points. The difference across panels is expected, as figure 1 shows that the effect of the mandate reform grows over time. Given that we sample mothers who had a birth in the previous 12 months, it is not until 2002 data that all of this group would be eligible to take the longer leave.

To calibrate these results we use the average of the dependent variables between July 1999 and November 2000 in all provinces save Quebec.²⁶ The 12-13 percentage point increase in leave is off a pre-reform base of 31 percent. The 12-14 percentage point decrease in work is off the same base. These are large changes. As figure 1 makes clear, by 2003 the proportion at work was below its level in 1976. Over the same period overall employment more than doubled.

The estimates from the other columns support this inference and vary in now expected ways (e.g., larger estimates for those with recent work). Also the estimates from the falsification exercise are small and statistically insignificant. We have again re-estimated the model adding polynomials in time and expanding the sample (to July 1997 through 2002). The results (not shown) support the inference from table 12, although the estimated effect of the mandate

²⁶ We exclude Quebec because was extended here to 70 weeks in March 1997.

extension is somewhat smaller when we add a cubic in time.²⁷

Since the extension is to one year of leave and the TSCS sample is mothers with a child aged less than one, these results cannot establish whether time spent at home post birth went up on average. Mothers who quit their jobs and stayed at home more than one year may post extension take a shorter leave. We have re-estimated our models, however, for the sample of women whose youngest child is aged one and find no effect of the extension on the labor supply of this group.²⁸ Therefore, it appears the number of mothers shortening their time at home is negligible.

The estimates for both the 1990 and the 2000 mandate expansions reveal large effects on leave-taking, time at home (the complement of employed at work) and job continuity. These results contrast with the estimates for mandates introductions in the 1970s and 1980s. It may be that private arrangements and the physical demands of birth render modest mandates redundant. Longer mandates exceed private arrangements and thus have a large effect on behavior.

These conclusions have implications for researchers investigating the effect of leaves on health and child development. Short leaves, such as those mandated by the FMLA in the U.S., may have no effect on time spent at home. If there is no effect on labor supply, there is no basis for the second-stage benefits.

8. The Results~Infant Health

Maternity leave can have a positive impact on infant welfare. While the benefits may take a variety of forms—increased periods of breastfeeding, better cognitive and emotional development—previous studies have focused on infant mortality rates and the incidence of low

²⁷ These results are available on request. The sensitivity of the results to the specification of time effects might be expected. Figure 1 shows that the mandate reform does not cause a sharp discontinuity because there is a lag until all of the sampled population is subject to the new provisions.

²⁸ The estimates are very small, statistically insignificant and available on request.

birth weight. The argument is that mothers provide better supervision of newborns, decreasing accidents and better monitoring any deterioration in infant health. We focus on these same measures of infant health to provide a link to this literature.

In table 13 we present estimates of equation (3) for the period 1961-2002. This period spans the mandate reforms examined in our analysis of labor supply, and adds the period 1961-1975 when five provinces introduced leave mandates. In the first column there is fairly consistent evidence that *WKS_{it}* has an effect on the measures of mortality. For each measure the estimate is negative—as expected—and statistically significant. In the next column we add province-specific linear trends to the specification. Infant mortality rates have been declining over the period in all provinces for a variety of reasons, and some of these may be province-specific. The effect on inference is dramatic. The estimates of *WKS_{it}* are uniformly much smaller, and now positive and statistically insignificant. In the third column we add quadratic provincial trends that may be more appropriate given the length of the sample period. While some estimates turn negative again, they are very small and statistically insignificant. We have also experimented with a quadratic specification of the *WKS_{it}* variable to allow the effect on infant health to vary across different durations.²⁹ The original inference remains: there is no evidence that leave mandates affect these measures of infant health.

The 1961-2001 sample period pools together different types of mandate reform. This may be inappropriate because our labor supply analysis indicates that different types of mandate extensions had different effects. In particular, we find little evidence that the introduction of mandates had an effect on the proportion of mothers employed and at work. To refine our

²⁹ Our experiments focus on neonatal and post-neonatal mortality, periods that correspond to the mandates under study. While the parameters of the quadratic in *WKS_{it}* are sometimes jointly significant, the inference is not robust to the changes in the specification of the province-specific trends. Also, the estimates often imply effects of implausible magnitude.

analysis, we focus on the parental leave reforms of 1990 and 2000 that did have an impact on the proportion of mothers at home with their newborns. We expect these reforms to have their primary effects in the post-neonatal period.

Figures 7 and 8 provide an overview. We again compare Quebec and Ontario. Near the end of 1990, each province introduced parental leave although the Quebec mandate was far more generous. In 2000, Ontario extended parental leave. Quebec had already extended its mandate in 1997. In neither figure is there evidence of an effect on these reforms on post neonatal mortality. There is no obvious trend break in 1991, nor evidence of a Quebec/Ontario gap emerging in 1997 or closing after 2000.

Our mortality data are annual, so we cannot exploit intra-year differences in enactment across provinces in our regression analysis. We are also mindful that there are few obvious additional controls for jurisdictional secular trends. Our strategy is to estimate a variant of (3) replacing the year effects with smooth functions of time, and replacing *WKSLEV* with the variable *POST* from equation (2). We code *POST* for each province on an annual basis. It captures any change in the within province time series variation of infant health with the introduction of parental leave, in addition to what is captured by the time effects. We use data for 1988 through 1993 and 1998-2002 for this analysis.

In the first panel of table 14 are the results for the 1990 reform. The estimates of *POST* are all negative and all insignificant. Taken at face value some of the results for post neonatal mortality imply fairly large effect, as the rate in the late 1980 was just above 2 deaths per 1000 births. In the next panel we present the results of a falsification exercise, coding the introduction of parental leave in each province as if it occurred 3 years earlier and using data from 1985 to 1990. While marginally larger, many of the estimates are again negative and insignificant. In fact there is not much to distinguish the results in the two panels.

We repeat the analysis in the third and fourth panels for the 2000 reform. The story is very similar, although now most estimates are positive and insignificant. Again there is little to distinguish the falsification exercise results from the estimates correctly coding the reforms.³⁰

We have re-estimated our equation adding the mortality rate for 1-4 year olds as a control for province specific trends. Focusing on post neonatal mortality, for the 1990 reform all estimates of the interaction of *POST* and an infant dummy variable are small and statistically insignificant. For the 2000 reform the interaction is negative and insignificant, and we cannot reject the hypothesis that the total effect for infants (the sum of the estimate of *POST* and the interaction) is equal to zero.

We conclude that there is little evidence in these data that the increase in time at home induced by the mandate reforms affected infant mortality. We cannot distinguish the estimated effects from regular secular variation in the data. One could argue that our identification strategy lacks power, but the evidence in figures 7 and 8 indicates that any effects of the reforms on mortality are very subtle.

9. Conclusions

We investigate the relationship between mandated job-protected maternity leave and the labor force behavior of mothers with newborns. Most significantly, our results provide convincing evidence of the first stage labor market relationships that must lie behind any effect of leaves on infants' or mothers' welfare. The analysis reveals that mandates can increase the time mothers spend at home with their infants and increase job continuity over the birth event. Importantly, the former result is not found for the introduction of modest mandates (17-18 weeks) that most likely duplicate existing private arrangements. Instead it is in the extension of

³⁰ Here the falsification exercise involves lagging the reform dates by 2 years to ensure the sample period does not contain the mandate changes in some provinces which occurred in the mid 1990s. As coded, the falsification period does overlap a 1997 mandate change in Quebec, but the results are insensitive to the omission of this province.

leaves to longer durations that the connection to labor supply is found.

These findings have important implications for previous research. First, they may explain the lack of consistent evidence of an impact of short mandates, such as the FMLA, on labor supply. Second, they provide some validation for the benefits ascribed to the longer leaves available in European countries.

There are also implications for future research. There is growing recognition that the first years are crucial to child development (e.g., Carnegie Task Force on Meeting the Needs of Young Children 1994), and in turn that childhood development is a strong predictor of success in adulthood (e.g., Heckman 1999). Maternity leave is a prominent government policy directed to the welfare of infants. There is also a connection to the large literature on maternal employment and child development. Increases in female employment over the last 100 years have precipitated dramatic changes in the way children are brought up. A substantial and increasing proportion of mothers work. Researchers have investigated many effects of this social transformation on children's cognitive, emotional and physical development.³¹ A central challenge in this literature is finding an instrument for maternal employment.³² Our findings for suggest that the maternity leave mandates may serve as an instrument for maternal employment in the first year, which will assist in answering these important questions.

An outstanding issue is how the behavioral effect of leaves varies with income replacement. The compensation of leaves in Canada is modest to European standards, but exceeds the norm in the U.S. If income replacement is important, our estimates likely overestimate the effect of a simple extension of the FMLA. That said, income replacement is gaining a constituency in the U.S. The Department of Labor's "Baby-UI" rule, in effect from 2000 to 2003, allowed states to

³¹ See the review contained in Ruhm (2000).

³² Recent advances involve richer controls for observable differences between working and non-working mothers (Baum 2002, Ruhm 2001), but typically there is no account of unobserved differences.

compensate maternity leaves through their Unemployment Insurance funds. While no states took advantage of this policy, the spirit of this compensation scheme is very similar to the Canadian system. California's Paid Family Leave Insurance Program, which supplements benefits available under State Disability Insurance, provides six weeks of income replacement for family leaves at a replacement ratio similar to Canada's.³³ Four other states provide benefits under disability insurance plans. Our estimates have relevance for this growing number of states that offer income replacement for family leaves.

³³ Program details are available at <http://www.edd.ca.gov/direp/pflfaq1.asp#RELATION%20OF%20PAID%20FAMILY%20LEAVE> (accessed June 30, 2004).

Appendix

On the Suitability of the Tenure Variable to Capture Job Continuity Pre/Post Birth

The tenure question in the LFS asks “When did ... start working [at name of employer]?”.

The responses to this question indicate that individuals interpret this question to mean first start

working at this employer rather than the start of the current job or employment period.

Table A-1: Distribution of Tenure among Mothers Employed in the Third and Fourth Month Following the MOB

Mothers Employed in the Third Month After the MOB

Tenure	1 month	2 months	3 months	4+ months	
--------	---------	----------	----------	-----------	--

All	4.2	4.5	2.2	89.1	
-----	-----	-----	-----	------	--

Those Not Employed in MOB	19.4	19.4	10.2	51.0	
---------------------------	------	------	------	------	--

Those Employed in MOB	1.1	1.4	0.5	97.0	
-----------------------	-----	-----	-----	------	--

Mothers Employed in the Fourth Month After the MOB

Tenure	1 month	2 months	3 months	4 months	5+ months	
--------	---------	----------	----------	----------	-----------	--

All	4.6	5.4	3.9	2.4	83.7	
-----	-----	-----	-----	-----	------	--

Those Not Employed in MOB	15.1	20.6	13.8	9.7	40.8	
---------------------------	------	------	------	-----	------	--

Those Employed in MOB	2.1	1.8	1.5	0.6	94.0	
-----------------------	-----	-----	-----	-----	------	--

Notes: Source is the LFS. MOB=month of birth. The reported statistics are the proportion of mothers working in the indicated month following the MOB who report the indicated current job tenure.

Some evidence is provided in table A-1. We report the distribution of current job tenure for mothers employed in the indicated month following the MOB for our 1976-1990 panel-based sample. For example, 4.2 percent of mothers working in the third month following the MOB report current job tenure of one month.

There are at least two striking results here. First, the overwhelming majority of mothers working in the third or fourth month following birth report a job tenure indicating they are with their pre-birth employer. Second, a substantial fraction of those who were not employed in their MOB also report a job tenure that indicates they are at their pre-birth employer: 51 percent of those working in the third month following birth and 41 percent of those working in the fourth. This suggests that these individuals interpret the tenure question to ask when they first started work with their current employer, not when the current employment period with the employer started.

Variable Definitions and Sources

Labor Supply Analysis

WKSLV: Weeks of mandated job-protected maternity/parental leave. Source is provincial statutes and Labor Canada (Various Issues).

□

Education: 0/1 indicator that the individual has completed some post-secondary education but not a degree; 0/1 indicator that the individual has completed a university degree. Source is LFS.

□

Other Child: 0/1 indicator of the presence of another child aged one or greater living at home. Source is LFS.

□

Infant Health Analysis

□

Perinatal Mortality Rate: The number of perinatal deaths (stillbirths (gestational age of 28 or more weeks) and early neonatal deaths (deaths in the first week of life)) per 1,000 total births (includes stillbirths). Unknown gestational age is excluded in both numerator and denominator. Source is Statistics Canada (1993, 1999) and CANSIM.

□

Neonatal Mortality Rate: The number of neonatal deaths (under 28 days of age) per

1,000 live births. Source is Statistics Canada (1993, 1999) and CANSIM.

□

Post-Neonatal Mortality Rate: The number of post-neonatal deaths (between 28 days and one year of age) per 1,000 live births. Source is Statistics Canada (1993, 1999) and CANSIM.

□

Infant Mortality Rate: Number of infants who die in the first year of life per 1,000 live births. Source is Statistics Canada (1993, 1999) and CANSIM.

□

Low Birth weight Rate: Number of low birth weight (<2500 grams) births per 1000 live births. Source is Statistics Canada (1993, 1999) and CANSIM.

□

Employment/Population Ratio: The employment population ratio for females aged 15 and older. Source is CANSIM.

□

Real GDP: Provincial GDP deflated by the national Consumer Price Index (CPI). Each variable combines information from two series that span a different parts of the full time period (1961-1996). The series were spliced by projecting missing values based on growth rates observed in the other series. Source is CANSIM.

□

Population: Total provincial population. Source CANSIM.

□

Fertility Rate: The ratio of the number of live births to the population of females aged 15-44.

□

Total Health Spending: Total (public and private) spending on health. Data are available for 1960, 1965, and 1970-2002. Missing values in the 1960s were imputed by linear interpolation. Source is the Canadian Institute of Health Information.

□

□

□

References

- Baum, Charles L. (2002), "The effect of work interruptions on women's wages," *Labor*, Vol. 16, No. 1, pp. 1-36.
- Baum, Charles L. II (2003a), "The effect of maternity leave legislation on mothers' labor supply after birth," *Southern Economic Journal*, Vol. 69, No. 4, pp. 772-799.
- Baum, Charles L. II (2003b), "The effect of state maternity leave legislation and the 1993 Family and Medical Leave Act on employment and wages," *Labor Economics*, Vol. 10, No. 5, pp. 573-596.
- Carnegie Task Force on Meeting the Needs of Young Children (2004), *Starting Points: Meeting the Needs of Our Youngest Children*. New York: Carnegie Corporation of New York.
- Chatterji, Pinka and Sara Markowitz (2004), "Does the length of maternity leave affect maternal health?" NBER Working Paper No. 10206.
- Gruber, Jonathan (1994), "The incidence of mandated maternity benefits," *American Economic Review*, Vol. 84, No. 3, pp. 622-641.
- Hansen, Christian (2004), "Generalized least squares inference in panel and multilevel models with serial correlation and fixed effects," mimeograph, University of Chicago
- Heckman, James J. (1999), "Policies to Foster Human Capital." NBER Working Paper #1288, August.
- Klerman, Jacob Alex and Arleen Leibowitz (1994), "The work-employment distinction among new mothers," *Journal of Human Resources*, Vol. 29, No. 2, pp. 277-303.
- Klerman, Jacob Alex and Arleen Leibowitz (1997), "Labor supply effects of state maternity leave legislation," in Francine D. Blau and Ronald G. Ehrenberg (eds.) *Gender and Family Issues in the Workplace*. New York: Russell Sage Foundation.
- Klerman, Jacob Alex and Arleen Leibowitz (1999), "Job continuity among new mothers," *Demography*, Vol. 36, No. 2, pp. 245-155.
- Labor Canada (Various Issues), "Employment Standards in Canada," Ottawa: Government of Canada.
- Lero D.S. "Research on Parental Leave Policies and Children's Development : Implications for Policy Makers and Service Providers." In: Tremblay RE, Barr RG, Peters RDeV, eds. *Encyclopedia on Early Childhood Development* [online]. Montreal, Quebec: Centre of Excellence for Early Childhood Development; 2003:1-9. Available at: <http://www.excellenceearlychildhood.ca/documents/LeroANGxp.pdf>. Accessed [April 26, 2004].

- Lindberg L.D. (1996), "Women's decisions about breastfeeding and maternal employment," *Journal of Marriage and the Family*, Vol. 58, No. 1, pp. 239-251.
- McGovern, P., Dowd, B., Gjerdingen, D., Moscovice, I., Kochevar, L. and Lohman, B. (1997), "Time off work and the postpartum health of employed women," *Medical Care*, Vol. 35 No. 5, pp. 507-521.
- Phipps, Shelley (2000), "Maternity and parental benefits in Canada: Are there behavioral implications?" *Canadian Public Policy*, Vol. 26, No. 4, pp. 415-436.
- Phipps, Shelley, Peter Burton, and Lynn Lethbridge (2001), "In and out of the labor market: long-term income consequences of child-related interruptions to women's paid work," *Canadian Journal of Economics*, Vol. 34, No. 2, pp. 411-429.
- Ruhm, Christopher J. (1998), "The economic consequences of parental leave mandates: Lessons from Europe," *Quarterly Journal of Economics*, Vol. 112, No. 1, pp. 285-317.
- Ruhm, Christopher J. (2000), "Parental Leave and Child Health", *Journal of Health Economics*, 19, 931-960.
- Shapiro, David and Frank L. Mott (1994), "Long-term employment and earnings of women in relation to employment behavior surrounding the first birth," *Journal of Human Resources*, Vol. 29, No. 2, pp. 248-275.
- Solon, Gary (1984), "Estimating Autocorrelations in Fixed-Effects Models," Technical Working Paper No. 32, National Bureau of Economic Research.
- Statistics Canada, (1993), *Selected Infant Mortality and Related Statistics, Canada, 1921-1990*, Catalogue 82-549, Ottawa: Government of Canada.
- Statistics Canada, (1999), *Vital Statistics Compendium, 1996*, Catalogue 84-214-XPE, Ottawa: Government of Canada.
- Statistics Canada, (Various Issues), *Unemployment Insurance Statistics*, Catalogue T3-202S, Ottawa: Government of Canada.
- Summers, Lawrence H. (1989), "Some simple economics of mandated benefits," *American Economic Association Papers and Proceedings*, Vol. 79, No. 2, pp. 177-183.
- ten Cate, Adrienne (2000), "Labor Market Effects of Maternity and Parental Leave Policy in Canada (2)", Mimeograph, McMaster University.
- ten Cate, Adrienne (2003), "The Impact of Maternity and Parental Leave Policies on Employment Rates of Women with Young Children in Canada", Mimeograph, McMaster University.

Waldfoegel, Jane (1998a), "The family gap for young women in the United States and Britain: Can maternity leave make a difference?" *Journal of Labor Economics*, Vol. 16, No. 3, pp. 505-545.

□

Waldfoegel, Jane (1998b), "Understanding the 'Family Gap' pay for women with children," *Journal of Economic Perspectives*, Vol. 12, No. 1, pp. 137-156.

□

Waldfoegel, Jane (1999), "The impact of the Family and Medical Leave Act," *Journal of Policy Analysis and Management*, Vol. 18, No. 2, pp. 281-302.

□

Waldfoegel, Jane, Yoshio Higuchi, and Masahiro Abe (1999), "Family leave policies and women's retention after childbirth: Evidence from the United States, Britain, and Japan," *Journal of Population Economics*, Vol. 12, pp. 523-545.

□

Winegarden, C.R. and Paula M. Bracy, "Demographic Consequences of Maternal-Leave Programs in Industrial Countries: Evidence from Fixed-Effects Models", *Southern Economic Journal*, 61, 1995, 1020-1035.

□

World Health Organization (2000), "Health Aspects of Maternity Leave and Maternity Protection," Statement to the International Labor Conference, June 2, 2000. Available online at <http://www.who.int/child-adolescent-health/publications/NUTRITION/Maternity.htm>. Accessed July 8, 2004.

□

Table 1: Weeks of Mandated Job-protected Maternity/Parental Leave by Province

	Fed.	AB	BC	MB	NB	NF	NS	ON	PEI	QU	SA
1963	0	0	12	0	0	0	0	0	0	0	0
1964	0	0	12	0	12	0	0	0	0	0	0
1965	0	0	12	0	12	0	0	0	0	0	0
1966	0	0	12	0	12	0	0	0	0	0	0
1967	0	0	12	0	12	0	0	0	0	0	0
1968	0	0	12	0	12	0	0	0	0	0	0
1969	0	0	12	0	12	0	0	0	0	0	0
1970	0	0	12	0	12	0	0	12	0	0	0
1971	15	0	12	0	12	0	0	12	0	0	0
1972	15	0	12	0	12	0	0	12	0	0	0
1973	15	0	12	0	12	0	17	12	0	0	18
1974	15	0	12	17	12	0	17	12	0	0	18
1975	15	0	12	17	12	0	17	17	0	0	18
1976	15	0	12	17	17	0	17	17	0	0	18
1977	15	18	12	17	17	0	17	17	0	0	18
1978	15	18	12	17	17	17	17	17	0	18	18
1979	15	18	12	17	17	17	17	17	0	18	18
1980	15	18	12	17	17	17	17	17	0	18	18
1981	15	18	18	17	17	17	17	17	0	18	18
1982	15	18	18	17	17	17	17	17	17	18	18
1983	15	18	18	17	17	17	17	17	17	18	18
1984	15	18	18	17	17	17	17	17	17	18	18
1985	41	18	18	17	17	17	17	17	17	18	18
1986	41	18	18	17	17	17	17	17	17	18	18
1987	41	18	18	17	17	17	17	17	17	18	18
1988	41	18	18	17	17	17	17	17	17	18	18
1989	41	18	18	17	17	17	17	17	17	18	18
1990	41	18	18	17	17	17	17	17	17	18	18
1991	41	18	30	34	29	17	34	35	34	52	18
1992	41	18	30	34	29	29	34	35	34	52	18
1993	41	18	30	34	29	29	34	35	34	52	18
1994	41	18	30	34	29	29	34	35	34	52	18
1995	41	18	30	34	29	29	34	35	34	52	18
1996	41	18	30	34	29	29	34	35	34	52	30
1997	41	18	30	34	29	29	34	35	34	70	30
1998	41	18	30	34	29	29	34	35	34	70	30
1999	41	18	30	34	29	29	34	35	34	70	30
2000	54	18	52	54	54	52	52	52	52	70	30
2001	54	52	52	54	54	52	52	52	52	70	52
2002	54	52	52	54	54	52	52	52	52	70	52

□
 Notes: Sources are provincial statutes and Labor Canada (Various Issues).

Table 2: Some Parameters of the UI/EI System

	Maximum Duration of Maternity/Parental Leave Benefits	Maximum Weekly Insurable Earnings	Statutory Replacement Rate	Effective Replacement Rate
1971	15	150	0.75	0.65
1972	15	150	0.75	0.65
1973	15	160	0.75	0.65
1974	15	170	0.75	0.65
1975	15	185	0.75	0.65
1976	15	200	0.67	0.58
1977	15	220	0.67	0.58
1978	15	240	0.67	0.58
1979	15	265	0.60	0.52
1980	15	290	0.60	0.52
1981	15	315	0.60	0.52
1982	15	350	0.60	0.52
1983	15	385	0.60	0.52
1984	15	425	0.60	0.52
1985	15	460	0.60	0.52
1986	15	495	0.60	0.52
1987	15	530	0.60	0.52
1988	15	565	0.60	0.52
1989	15	605	0.60	0.52
1990	15	640	0.60	0.52
1991	25	680	0.60	0.55
1992	25	710	0.60	0.55
1993	25	745	0.57	0.52
1994	25	780	0.55	0.51
1995	25	815	0.55	0.51
1996	25	750	0.55	0.51
1997	25	750	0.55	0.51
1998	25	750	0.55	0.51
1999	25	750	0.55	0.51
2000	25	750	0.55	0.51

Notes: Source is Statistics Canada (Various Issues).

Table 4: Descriptive Statistics of the Labor Supply of Females Around the MOB 1976-2002 from the Panel-based Sample.

Month	Employed and on Leave	Employed and At Work
MOB-1	0.26 (0.44)	0.25 (0.43)
MOB	0.42 (0.49)	0.05 (0.22)
MOB+1	0.40 (0.49)	0.07 (0.25)
MOB+2	0.37 (0.48)	0.10 (0.30)
MOB+3	0.33 (0.47)	0.16 (0.36)
MOB+4	0.27 (0.45)	0.22 (0.41)
(Employed MOB+3 & Tenure>3) Employed MOB+3		0.93 (0.26)
(Employed MOB+4 & Tenure>4) Employed MOB+4		0.89 (0.31)
Left Job within 12 months of MOB		0.26 (0.44)
Left Job within 12 months of MOB due to personal/family reasons		0.15 (0.15)

Notes: Source is the LFS. MOB is month of birth. Standard deviations in parentheses.

Table 5: Impact of the Introduction of Mandated Leave on Employed on Leave and Employed at Work from Panel-based Sample

Employed and On Leave						
MOB-2	0.0015 (0.0006)	0.0006 (0.0006)	0.0008 (0.0006)	0.0010 (0.0013)	-0.0002 (0.0009)	-0.0004 (0.0011)
MOB-1	0.0030 (0.0015)	0.0032 (0.0009)	0.0029 (0.0009)	0.0054 (0.0014)	0.0032 (0.0012)	0.0049 (0.0006)
MOB	0.0016 (0.0014)	0.0031 (0.0009)	0.0032 (0.0009)	0.0057 (0.0024)	0.0028 (0.0010)	0.0051 (0.0017)
MOB+1	0.0021 (0.0018)	0.0047 (0.0017)	0.0051 (0.0015)	0.0077 (0.0029)	0.0036 (0.0020)	0.0038 (0.0020)
MOB+2	-0.0002 (0.0016)	0.0037 (0.0013)	0.0046 (0.0012)	0.0068 (0.0028)	0.0026 (0.0018)	0.0032 (0.0018)
MOB+3	0.0024 (0.0020)	0.0050 (0.0015)	0.0059 (0.0014)	0.0071 (0.0029)	0.0045 (0.0016)	0.0035 (0.0024)
Employed and At Work						
MOB-2	0.0006 (0.0011)	0.0019 (0.0008)	0.0017 (0.0011)	0.0033 (0.0016)	0.0028 (0.0012)	0.0023 (0.0013)
MOB-1	-0.0014 (0.0011)	0.0001 (0.0007)	-0.0003 (0.0008)	0.0002 (0.0009)	0.0001 (0.0009)	-0.0012 (0.0014)
MOB	-0.0001 (0.0002)	0.0002 (0.0005)	0.0002 (0.0006)	0.0003 (0.0005)	-0.0004 (0.0015)	-0.0014 (0.0014)
MOB+1	0.0001 (0.0006)	-0.0011 (0.0003)	-0.0012 (0.0004)	-0.0014 (0.0008)	0.0004 (0.0009)	-0.0007 (0.0011)
MOB+2	0.0009 (0.0016)	-0.0010 (0.0009)	-0.0013 (0.0010)	-0.0023 (0.0018)	0.0007 (0.0013)	-0.0004 (0.0014)
MOB+3	-0.0003 (0.0014)	-0.0008 (0.0010)	-0.0011 (0.0010)	-0.0030 (0.0022)	0.0004 (0.0013)	0.0010 (0.0019)
Provincial Trends	No	Yes	Yes	Yes	Yes	Yes
Federal Sector	Deleted					
Recent Work	Yes					
Control Group				Males		Childless Females

Notes: Reported statistics are the parameter on weeks of mandated leave from a regression of the indicated variable on weeks of leave, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period is 1976 through October 1990. MOB is month of birth.

Table 6: Impact of Introduction of Mandated Leave on Job Continuity from Panel-based Sample

Employed	0.0016	0.0034	0.0040	0.0042	0.0034	0.0051
MOB+3 Tenure>3	(0.0017)	(0.0013)	(0.0012)	(0.0022)	(0.0016)	(0.0035)
Left Last Job	-0.0000	-0.0031	-0.0031	-0.0060	-0.0025	-0.0036
	(0.0013)	(0.0011)	(0.0010)	(0.0021)	(0.0020)	(0.0013)
Left Last Job- Personal	-0.0018	-0.0031	-0.0034	-0.0058	-0.0030	-0.0027
	(0.0009)	(0.0014)	(0.0015)	(0.0026)	(0.0014)	(0.0013)
Provincial Trends	No	Yes	Yes	Yes	Yes	Yes
Federal Sector	Delete					
Recent Work	Yes					
Control Group				Males	Childless	
					Females	

Notes: Reported statistics are the parameter on weeks of mandated leave from a regression of the indicated variable on weeks of leave, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period is 1976 through October 1990. MOB is month of birth.

Table 7: Impact of Introduction of Mandated Leave on Employed on Leave and Employed at Work from Time Series of Cross Sections Sample

Current Mandate						
Employed and on Leave	0.0011	0.0014	0.0016	0.0027	0.0014	0.0017
	(0.0006)	(0.0005)	(0.0005)	(0.0010)	(0.0006)	(0.0005)
Employed and at Work	-0.0004	0.0000	0.0000	-0.0002	-0.0001	-0.0004
	(0.0004)	(0.0006)	(0.0005)	(0.0012)	(0.0006)	(0.0004)
Three Month Lagged Mandate						
Employed and on Leave	0.0010	0.0014	0.0016	0.0027	0.0014	0.0019
	(0.0006)	(0.0005)	(0.0005)	(0.0010)	(0.0006)	(0.0005)
Employed and at Work	-0.0007	-0.0004	-0.0004	-0.0007	-0.0002	-0.0008
	(0.0003)	(0.0005)	(0.0005)	(0.0010)	(0.0006)	(0.0006)
Provincial Trends	No	Yes	Yes	Yes	Yes	Yes
Federal Sector	Delete					
Recent Work	Yes					
Control Group				Males	Childless	
					Females	

Notes: Reported statistics are the parameter on weeks of mandated leave from a regression of the indicated variable on weeks of leave, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period is 1976 through October 1990. MOB is month of birth.

Table 8: Impact of the 1990 Extension of Mandated Leave on Employed on Leave and Employed at Work from Panel-based Sample.

Employed and On Leave							
MOB-2	-0.0121	-0.0026	-0.0170	-0.0095	0.0114	-0.0090	-0.0156
	(0.0114)	(0.0089)	(0.0091)	(0.0096)	(0.0118)	(0.0114)	(0.0096)
MOB	-0.0101	0.0120	-0.0298	0.0085	0.0292	0.0110	0.0226
	(0.0120)	(0.0167)	(0.0192)	(0.0182)	(0.0182)	(0.0173)	(0.0172)
MOB+3	0.0221	0.0610	0.0142	0.0405	0.0958	0.0728	0.0499
	(0.0236)	(0.0291)	(0.0277)	(0.0330)	(0.0343)	(0.0302)	(0.0333)
MOB+4	0.1128	0.1558	0.0121	0.1520	0.2268	0.1674	0.1922
	(0.0228)	(0.0339)	(0.0204)	(0.0345)	(0.0519)	(0.0391)	(0.0414)
Employed and at Work							
MOB-2	-0.0344	-0.0202	0.0448	-0.0139	-0.0248	0.0268	-0.0001
	(0.0096)	(0.0165)	(0.0206)	(0.0170)	(0.0222)	(0.0163)	(0.0228)
MOB	-0.0184	-0.0217	-0.0041	-0.0197	-0.0241	0.0121	-0.0217
	(0.0071)	(0.0050)	(0.0079)	(0.0060)	(0.0061)	(0.0072)	(0.0141)
MOB+3	-0.0484	-0.0564	-0.0175	-0.0472	-0.0809	-0.0198	-0.0187
	(0.0198)	(0.0166)	(0.0154)	(0.0184)	(0.0232)	(0.0195)	(0.0322)
MOB+4	-0.1010	-0.1259	-0.0399	-0.1345	-0.1343	-0.1121	-0.1897
	(0.0217)	(0.0285)	(0.0324)	(0.0306)	(0.0432)	(0.0319)	(0.0568)
Years	1990-	1989-	1986-	1989-	1989-	1989-	1989-
	1991	1992	1989	1992	1992	1992	1992
Federal	Delete						
Recent Work	Yes						
Control Group	Males						Childless
							Females

Notes: Reported statistics are the parameter on a 0/1 indicator of the introduction of parental leave from a regression of the indicated variable on leave indicator, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period as indicated. MOB is month of birth.

Table 9: Impact of the 1990 Extension of Mandated Leave on Job Continuity from Panel-based Sample

Employed	-0.0075	0.0286	-0.0176	0.0078	0.0435	0.0808	0.0477
MOB+3	(0.0223)	(0.0260)	(0.0334)	(0.0287)	(0.0304)	(0.0304)	(0.0349)
Tenure>3							
Employed	0.0918	0.0911	-0.0572	0.0764	0.1454	0.1221	0.0414
MOB+4	(0.0335)	(0.0277)	(0.0320)	(0.0286)	(0.0363)	(0.0349)	(0.0492)
Tenure>4							
Left Last Job	0.0065	-0.0164	0.0529	-0.0143	-0.0051	-0.0414	-0.0143
	(0.0094)	(0.0149)	(0.0156)	(0.0142)	(0.0179)	(0.0149)	(0.0187)
Left Last Job- Personal	-0.0223	-0.0233	0.0432	-0.0208	-0.0241	-0.0226	-0.0193
	(0.0100)	(0.0128)	(0.0121)	(0.0116)	(0.0166)	(0.0126)	(0.0130)
Years	1990- 1991	1989- 1992	1986- 1989	1989- 1992	1989- 1992	1989- 1992	1989- 1992
Federal	Delete						
Recent Work	Yes						
Control Group							Males Childless Females

Notes: Reported statistics are the parameter on a 0/1 indicator of the introduction of parental leave from a regression of the indicated variable on leave indicator, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period as indicated. MOB is month of birth.

Table 10: An Account of the Change in the Proportion of Mothers Employed MOB+4 with Tenure>4

Change in the Proportion of Mothers Employed MOB+4 with Tenure>4	0.0911 (0.0277)
Change in Overall Employment at MOB+4	0.0299 (0.0230)
Change in the Proportion of Mothers Employed MOB+4 with Tenure=1	-0.0041 (0.0094)
Change in the Proportion of Mothers Employed MOB+4 with Tenure=2	-0.0290 (0.0106)
Change in the Proportion of Mothers Employed MOB+4 with Tenure=3	-0.0136 (0.0074)
Change in the Proportion of Mothers Employed MOB+4 with Tenure=4	-0.0145 (0.0064)
Total Change in Employment at Tenures<5 (Sum of Rows 3-6)	0.0612

Notes: Reported statistics are the parameter on a 0/1 indicator of the introduction of parental leave from a regression of the indicated variable on leave indicator, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period is 1989-1992. MOB is month of birth.

Table 11: Impact of the 1990 Extension of Mandated Leave on Employed on Leave and Employed at Work from Time Series of Cross Sections Sample.

Current Mandate							
Employed and on Leave	0.0289 (0.0042)	0.0400 (0.0068)	-0.0122 (0.007)	0.0424 (0.0071)	0.0610 (0.0103)	0.0405 (0.0069)	0.0438 (0.0069)
Employed and at Work	-0.0282 (0.0084)	-0.0333 (0.0075)	0.016 (0.008)	-0.0359 (0.0074)	-0.0387 (0.0111)	0.0044 (0.0072)	-0.0153 (0.0073)
Six Month Lagged Mandate							
Employed and on Leave	0.0333 (0.012)	0.0449 (0.008)	N.A.	0.00480 (0.0072)	0.0688 (0.0109)	0.0443 (0.0084)	0.0443 (0.0083)
Employed and at Work	-0.0282 (0.0106)	-0.0328 (0.0072)	N.A.	-0.0334 (0.0078)	-0.0429 (0.0097)	0.0052 (0.0060)	-0.0119 (0.0080)
Years	1990-1991	1989-1992	1986-1989	1989-1992	1989-1992	1989-1992	1989-1992
Federal	Delete						
Recent Work	Yes						
Control Group	Males						Childless Females

Notes: Reported statistics are the parameter on a 0/1 indicator of the introduction of parental leave from a regression of the indicated variable on leave indicator, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period as indicated. MOB is month of birth. N.A is not applicable.

Table 12: Impact of the 2000 Extension of Mandated Leave on Employed on Leave and Employed at Work from Time Series of Cross Sections Sample.

Current Mandate							
Employed and on Leave	0.0435 (0.0117)	0.0939 (0.0175)	0.0039 (0.0079)	0.0868 (0.0183)	0.1404 (0.0217)	0.0972 (0.0180)	0.0851 (0.0196)
Employed and at Work	-0.0538 (0.0084)	-0.1107 (0.0188)	0.0006 (0.0107)	-0.1045 (0.0186)	-0.1672 (0.0244)	-0.1131 (0.0187)	-0.0899 (0.0214)
9 Month Lagged Mandate							
Employed and on Leave	0.1112 (0.0175)	0.1283 (0.0108)	N.A.	0.1244 (0.0106)	0.1818 (0.0154)	0.1300 (0.0110)	0.1223 (0.0125)
Employed and at Work	-0.0985 (0.0156)	-0.1422 (0.0122)	N.A.	-0.1355 (0.0120)	-0.1982 (0.0160)	-0.1425 (0.0127)	-0.1201 (0.0166)
Years	2000-2001	1999-2002	1997-1999	1999-2002	1999-2002	1999-2002	1999-2002
Federal	Delete						
Recent Work	Yes						
Control Group	Males Childless Females						

Notes: Reported statistics are the parameter on a 0/1 indicator of the extension of parental leave from a regression of the indicated variable on leave indicator, province, year and calendar month effects, a cubic in age, education (three categories) and a control for siblings aged 1-24. Robust standard errors are in parentheses. Sample period as indicated. MOB is month of birth. N.A is not applicable.

Table 13: Impact of Weeks of Mandated Leave on Various Measure of Infant Mortality and the Incidence of Low Birth weight, 1961-2002

Infant Mortality	-0.049 (0.016)	0.034 (0.031)	-0.002 (0.026)
Perinatal Mortality	-0.070 (0.017)	0.009 (0.031)	-0.015 (0.026)
Neonatal Mortality	-0.032 (0.011)	0.013 (0.018)	-0.001 (0.015)
Post-Neonatal Mortality	-0.012 (0.005)	0.010 (0.010)	-0.001 (0.013)
Low Birth Weight	-0.008 (0.005)	0.003 (0.004)	0.000 (0.004)
Provincial Trends	No	Linear	Quadratic

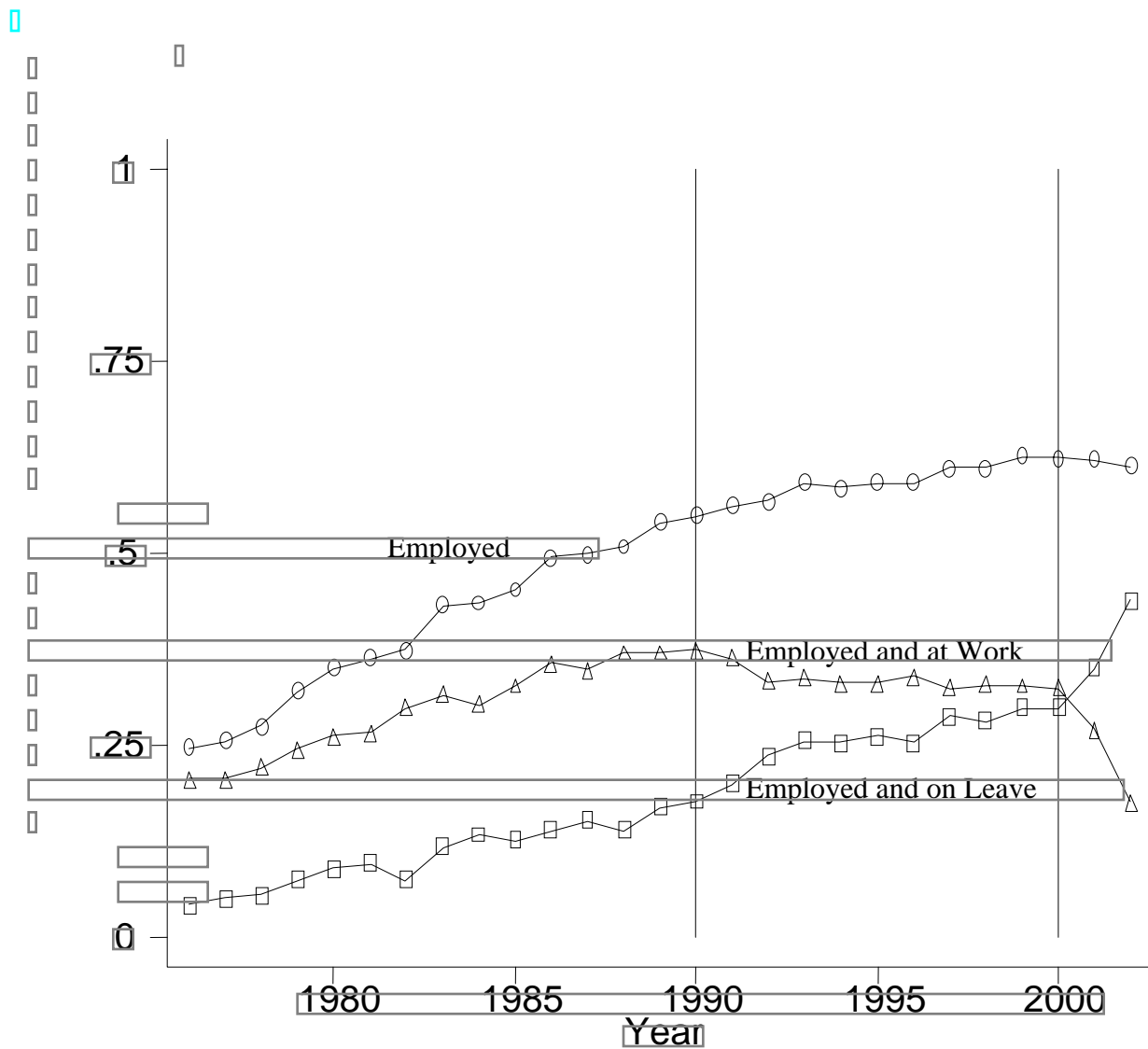
Notes: Reported statistics are the parameter on weeks of mandated leave from a regression of the indicated variable on weeks of leave, province and year effects, the employment population ratio of females aged 15+, the ratio of annual births to the female population aged 15 to 44, real provincial GDP per capita, total provincial health expenditures as a percent of GDP and the indicated provincial trends. Robust standard errors are in parentheses.

Table 14: The Impacts of the 1990 and 2000 Extensions of Parental Leave on Various Measures of Infant Mortality

Time trend	Infant Mortality	Perinatal Mortality	Neonatal Mortality	Post-Neonatal Mortality
1990 Reform				
Linear	-0.397 (0.385)	-0.475 (0.550)	-0.340 (0.309)	-0.080 (0.258)
Quadratic	-0.521 (0.432)	-0.511 (0.629)	-0.435 (0.333)	-0.112 (0.292)
Cubic	-0.156 (0.353)	-0.537 (0.643)	-0.182 (0.330)	-0.007 (0.292)
1990 Falsification (reforms coded 3 years earlier)				
Linear	-0.311 (0.404)	-0.626 (0.655)	-0.721 (0.425)	0.411 (0.296)
Quadratic	-0.326 (0.394)	-0.639 (0.659)	-0.740 (0.426)	0.414 (0.301)
Cubic	-0.173 (0.399)	-0.741 (0.674)	-0.660 (0.418)	0.487 (0.310)
2000 Reform				
Linear	0.750 (0.658)	0.528 (0.682)	0.726 (0.521)	0.023 (0.310)
Quadratic	0.715 (0.770)	0.916 (0.788)	0.788 (0.618)	-0.073 (0.308)
Cubic	0.950 (1.019)	1.418 (0.984)	0.697 (0.862)	0.253 (0.425)
2000 Falsification (reforms coded 2 years earlier)				
Linear	0.935 (0.597)	0.252 (0.501)	0.694 (0.545)	0.250 (0.248)
Quadratic	0.843 (0.647)	0.138 (0.634)	0.656 (0.657)	0.214 (0.284)
Cubic	0.561 (0.869)	-0.402 (0.731)	0.484 (0.780)	0.191 (0.340)

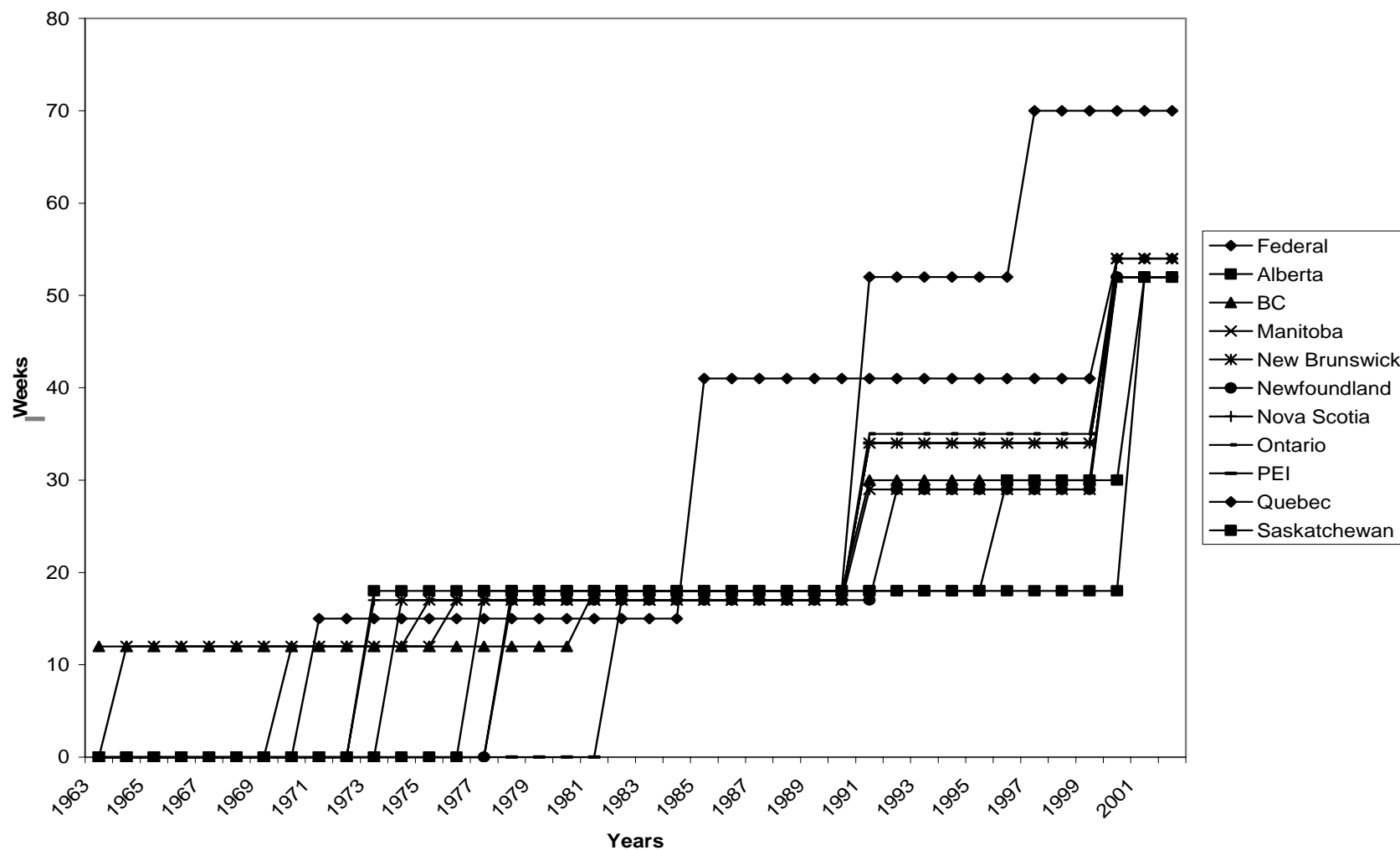
Notes: Reported statistics are the parameter on a 0/1 indicator of the introduction of parental leave from a regression of the indicated mortality variable on this indicator, province effects, the employment population ratio of females aged 15+, the ratio of annual births to the female population aged 15 to 44, real provincial GDP per capita, total provincial health expenditures as a percent of GDP and the indicated time trends. Robust standard errors are in parentheses.

Figure 1: The Employment Rates of Married Females Aged 20-39 with a Child Aged less than One: 1976-2002



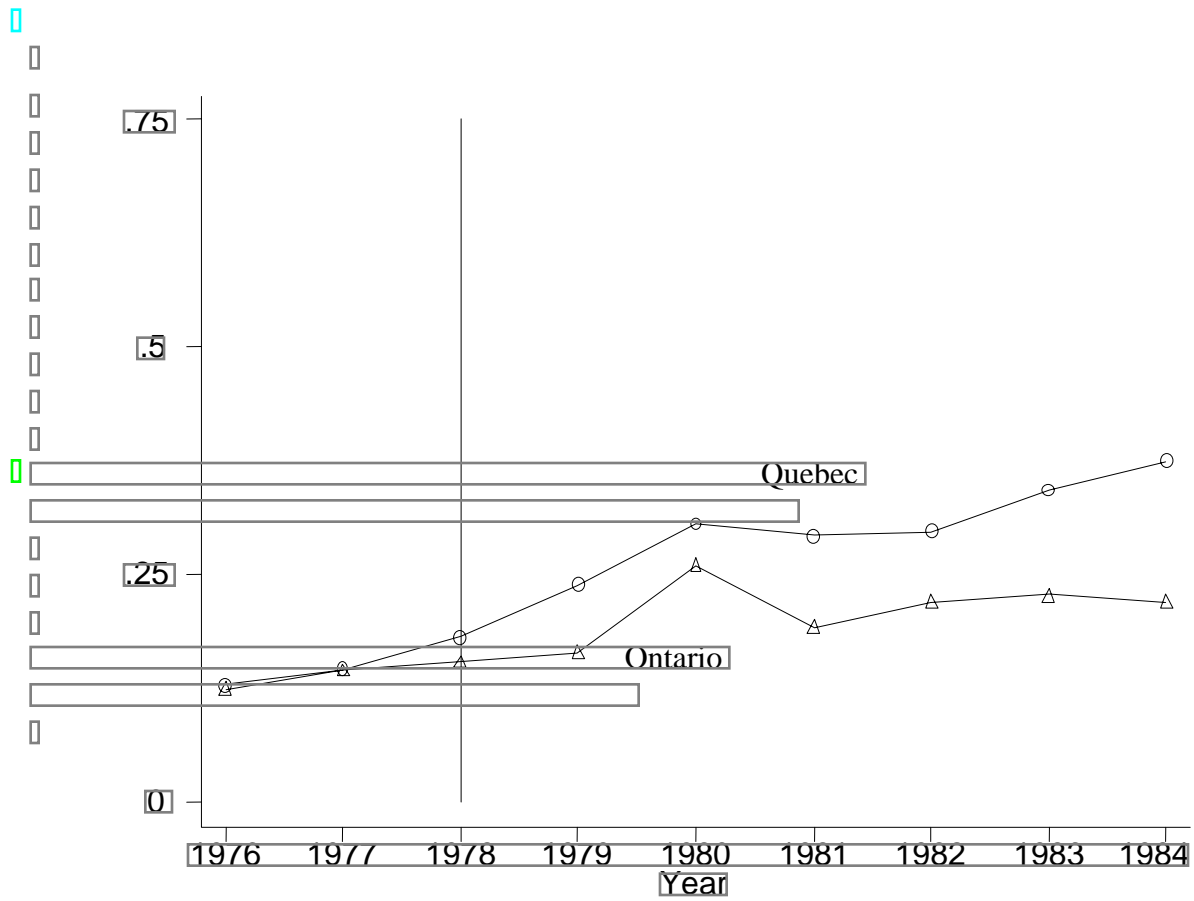
Notes: Source is the April and October files of the LFS.

Figure 2: Maximum Job-protected Maternity/Parental Leave Mandates by Province, 1963-2002



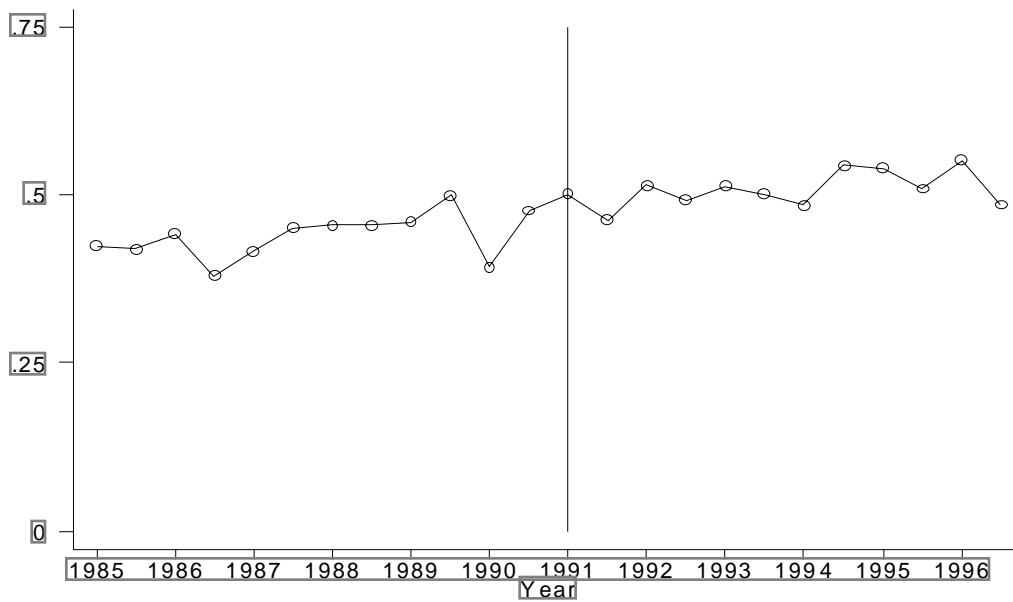
Notes: See Table 1.

Figure 3: The Proportion of Married Mothers, Aged 20-39, Employed and On Leave in the Month Before Birth



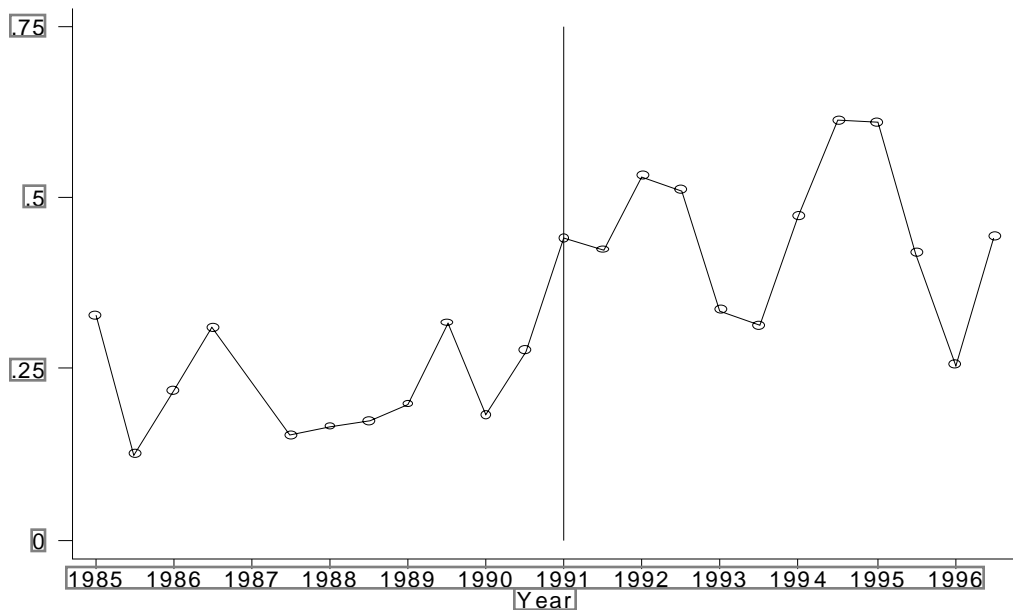
Notes: Source is the panel-based sample from the LFS.

Figure 4: The Proportion of Married Mothers, Aged 20-39, Employed and On Leave in the “Month of Birth”



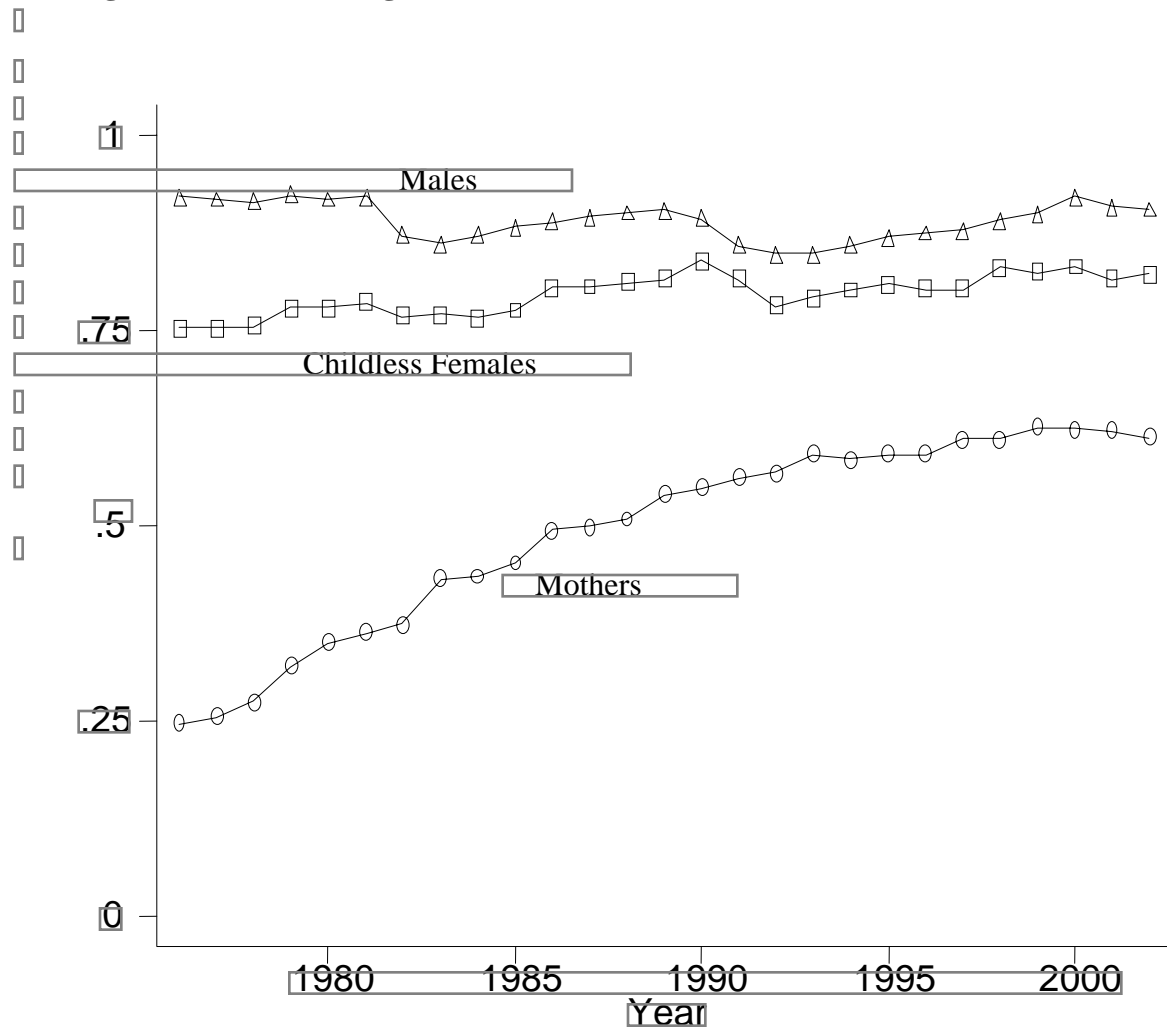
Notes: Source is the panel-based sample from the LFS. The proportion reported is for the provinces of British Columbia, New Brunswick, Prince Edward Island and Quebec.

Figure 5: The Proportion of Married Mothers, Aged 20-39, Employed and On Leave Four Months after the “Month of Birth”



Notes: Source is the panel-based sample from the LFS. The proportion reported is for the provinces of British Columbia, New Brunswick, Prince Edward Island and Quebec.

Figure 6: The Employment Rate of Married Males, Childless Females and Females with a Child Aged less than One, Aged 20-39: 1976-2002



Notes: Source is the April and October files of the LFS.

Figure 7: The Post-Neonatal Mortality Rates in Ontario and Quebec 1985-1996

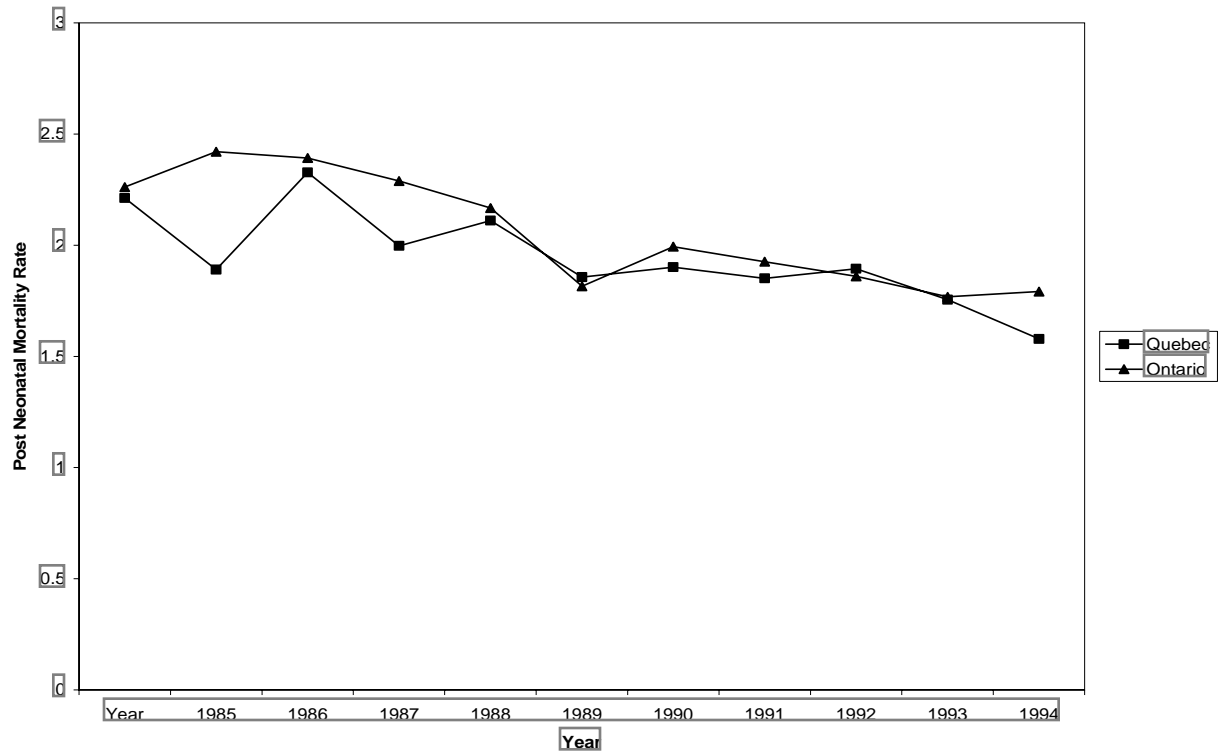
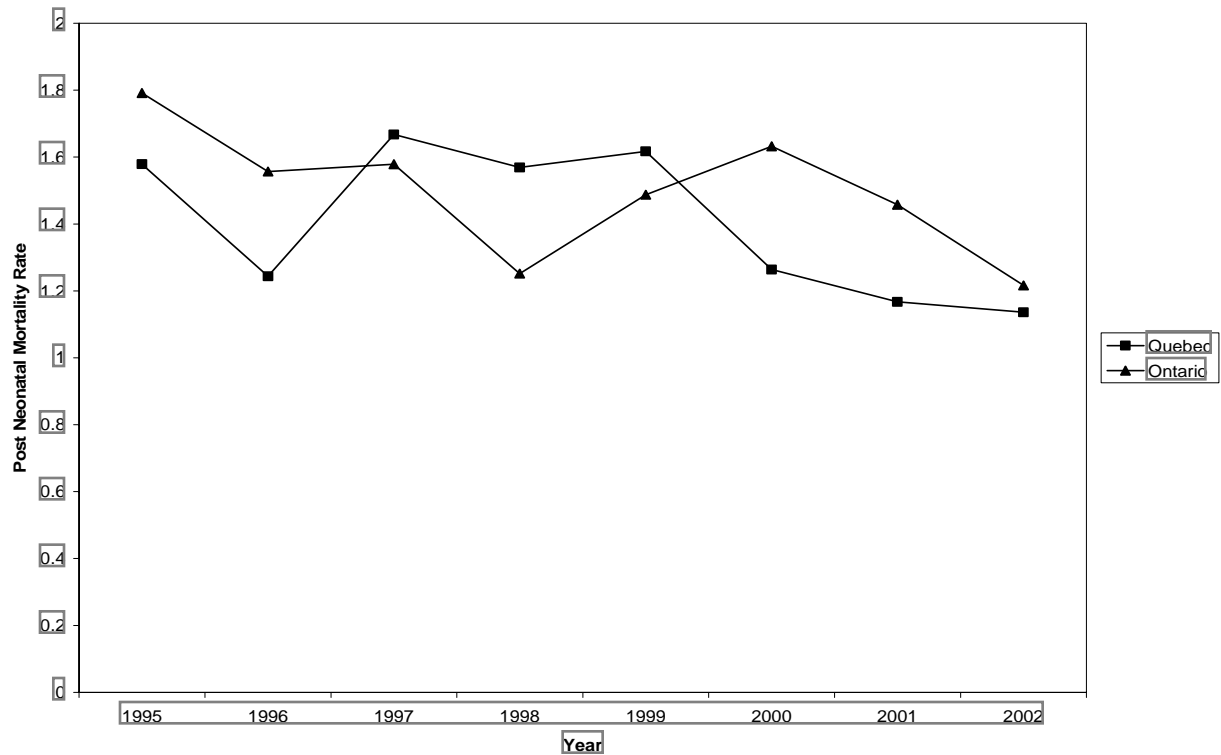


Figure 8: The Post-Neonatal Mortality Rates in Ontario and Quebec 1995-2002



Notes: Source for figures 7 and 8 is vital statistics.