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Investigation into the impact of maternity and parental leave policies on women's labour market outcomes

This dissertation uses Survey of Labour and Income Dynamics data and a difference-in-differences approach to study the effect of maternity and parental leave policies on women's labour market outcomes, specifically employment, hourly wages and hours worked. The analysis exploits the 2000 expansion of parental leave in Canada to test the hypothesis that leave has varying effects at different durations and to analyse the dynamics of the treatment effect. The results suggest insignificant effects on employment and hourly wages but a significant negative effect on hours worked that persists for up to five years.

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1. Introduction

The double objective of fully recovering and bonding with a newborn whilst maintaining career continuity for a working woman post-birth, has been progressively recognised during the past century as female workforce participation has increased dramatically in high-income countries. Different family leave systems are offered today across OECD countries that grant new mothers the right to take a leave of absence in the period surrounding childbirth and aim to facilitate their return to work after this absence. Yet, significant 'family gaps' in wages and employment rates between women with children and without children remain, with these gaps varying across countries (Harkness and Waldfogel, 1999).

As calls for maternity leave lengthening increase, it is important to understand the role of maternity leave in explaining these differences and whether further expansions are desirable. Supporters of family leave extensions emphasise their contributions to the goals of child development and gender equality in the workplace. Opponents, however, raise concerns about too generous family leave rules that may have persistent and detrimental effects on women's careers because of the loss of work experience and a reduction in demand for female labour among employers. The question of whether maternity leave policies enhance or impair women's position in the workplace has important policy implications. If legislated maternity leave available to new mothers undermines female career prospects, the general trend towards longer leave rules across OECD countries should certainly be reconsidered.

This paper uses the heterogeneous expansion of leave entitlements across provinces of Canada following the 2000 reform to examine closely two questions. The first question looks at the effect of maternity leave expansion on employment, hourly wages and hours worked and whether this effect varies by expansion intensity. The wage effects of maternity leave in the Canadian context have not been studied yet, as far as I know. This is surprising given how central the question of parental leave has been in the 2015 general election. The second question examines the dynamics of the treatment effect providing evidence on the persistence of the treatment effect.

Using cross-sectional data from the Survey of Labour and Income Dynamics 1996-2006, I answer the first question by employing a differences-in-differences approach comparing changes in outcomes of interest for mothers with children under the age of two, surveyed in 1999 and 2002, relative to mothers with children aged 5 to 17 years. To answer my

second question, I expand the sample to include the years from 1996 to 2006 and add leads and lags to my regression equations.

I find that the maternity leave expansion had a significant negative effect on average hours worked for the treatment group relative to the control group, with no significant variation in the treatment effect across provinces. In addition, I find that the policy change has no significant effects on the probability of being employed and on hourly wages, suggesting that the reform achieved its objective of increasing the average time mothers spend at home with their newborns without losing their jobs.

This dissertation proceeds as follows. Section 2 describes the maternity and parental leave legislation in Canada. Section 3 outlines the theory of maternity leave. Section 4 provides a review of empirical evidence, section 5 describes the data and the empirical strategy, section 6 presents the results and section 7 concludes.

2. Canadian Leave Legislation

A working woman has access to two types of family leave policies in Canada: maternity leave and parental leave. Maternity leave is a leave of absence available to expectant or new mothers during which their pre-birth job is protected. Parental leave is employment-protected leave of absence available to both employed parents. It is mostly used by new mothers and it usually acts as a supplement to maternity leave.[1] There are three key components to these policies: the duration of job projection, the rate and duration of income replacement conditional on returning to work, and eligibility for leave and income support.

In Canada, maternity and parental leaves are mainly established through provincial employment standards legislation.[2] The legislation prohibits dismissal of women due to pregnancy, prescribes the maximum period of maternity and parental leave and specifies eligibility requirements. Leave eligibility is based on a qualified period of employment and varies across provinces. On return from leave, the worker must be provided with the same or a comparable job in terms of duties, wages and benefits.

The total maximum duration of job protection has varied across provinces and time. While the first legislation prohibiting employment of women for 6 weeks following pregnancy was introduced as early as in 1921 by British Columbia, it was only by 1982 that all provinces

[1] Marshall (2008) finds that the proportion of fathers taking time off using paid parental leave benefits was only 3% in 2000.
[2] Federal employees fall under the job protection legislation of the federal government.

had a mandate. By mid-1980s, all provinces provided job-protection under maternity leave for 17 to 18 weeks. In 1990, parental leave was introduced expanding the total leave available to mothers in most provinces to between 29 and 52 weeks.

Income replacement in Canada is provided by the federal insurance program. This is financed entirely through employer and employee premiums. Employers are responsible for deducing premiums from employees, and the employer pays a premium of 1.4 times the employee premium. Maternity leave benefits were first introduced in 1971 and could be claimed by mothers for the duration of 15 weeks, 2 weeks after the start of leave. Under maximum leave entitlements, benefits replaced 50-55% of weekly wages. To qualify for these benefits, women had to have worked 300 hours in the previous 52 weeks. In January 1997, this eligibility requirement was increased to 700 hours in the previous 52 weeks. In 1990, 10 weeks of income replacement for parental leave was introduced with same eligibility criteria as for maternity leave benefits.

A major reform came at the end of 2000 when the federal government expanded the duration of income replacement for parental leave from 10 to 35 weeks. In response, all provinces increased the duration of parental leave to align it with the maximum income replacement period, except for Quebec that had already expanded the total job protection to 70 weeks in 1997. This increased the total leave available to women in all provinces, except Quebec, to around 52 weeks. Table 1 summarises the provincial changes in job-projected leave as a result of the 2000 reform.

The analysis below focuses on the effects of the total amount of leave available for new mothers, including parental leave and maternity leave. For simplicity in what follows I will refer to this variable as “maternity leave”.

3. Economics of Maternity Leave

Theories of maternity leave may be split into those that focus on justifications for leave mandates; those that explain direct effects on return-to-work decisions and wages of new mothers; and those that analyse the indirect effects, specifically, the response of employer demand for female labour, selection mechanisms, and negative effects on wages related to lengthy leaves. Overall, the theory suggests that maternity leave has a negative effect on hours worked and an ambiguous effect on employment and wages.

3.1 Justifications

In a perfectly competitive labour market mandated maternity leave is undesirable because it reduces economic efficiency by restricting the ability of employers and employees to freely negotiate the optimal compensation package (Summers, 1989; Mitchell 1990; Ruhm, 1998). For example, assuming the employer can compensate his employees in different ways, if a maternity leave that costs an employer £10 to provide is worth £20 to an employee, a trade will occur in which the employer provides the benefit and reduces the employee's salary by £10 or more, making both parties better off (Summers, 1989). However, voluntary negotiated private arrangements may fail to yield efficient outcomes due to market failures leading to a lower leave duration than socially optimal.

Aghion and Hermalin (1990) expand the model by Rothschild and Stiglitz (1976) and show that adverse selection under imperfect information provides one type of such imperfections. If a woman knows better than her potential employer whether she will need maternity leave, she will choose to work for an employer that voluntarily provides it. If other employers do not provide this benefit, the employer will attract only 'high risk' women and will be forced to lower wages. In the situation where 'low risk' workers signal their status to employers by agreeing to contracts that provide no or little maternity leave, the firm will reduce the duration of voluntary provided leave below the optimal level in order to attract 'low risk' females. A government mandate may solve the adverse selection problem by mandating a leave that enhances total social welfare.

Another rationale for government intervention in the area of birth related benefits is externalities. Externalities arise when the costs and benefits of an economic activity accrue to a third party. If a woman and her employer do not have enough information concerning the health advantages to her child associated with staying at home longer after birth, the private value that they place on leave will be lower than its social value and the duration of leave will be suboptimal. The findings of positive externalities on child health support this logic (Ruhm, 2000).

Lastly, if there is a capital market failure whereby future mothers are unable to access capital markets to smooth consumption through periods of absence, they may choose not to take the full amount of maternity leave if no income replacement is provided. This explains why government mandates that provide both job protection and income support are desirable (Low and Sánchez-Marcos, 2015).

3.2 First Order Effects

Klerman and Leibowitz (1997) propose a model of the effect of maternity leave on labour supply decisions of new mothers. In this static framework, a woman that is currently employed receives a constant wage offer. Suppose her employer offers a voluntary maternity leave of four weeks, after which the job is no longer open. If the woman becomes pregnant she faces two choices: (a) remain with her current employer by taking the maternity leave and return to work in four weeks, (b) stay out of work for a period longer than four weeks and return to work when she likes by finding a new job. The key assumption of the model is that at the new job the woman earns a lower wage than her wage at the previous job. First, this could be because some of the skills she accumulates during her training at the old job are 'firm-specific' and they will not be rewarded elsewhere. Second, she might incur additional job search costs if she quits her old job. How the woman responds to the choice that she faces when she becomes pregnant depends on her preferences for leave duration. Assuming convex and well-behaved preferences, there are three possible outcomes given the leave duration offered by the employer and the wage offer at the present and the alternative job. First, women with a low preference for maternity leave (who prefer four weeks of leave or less) choose a leave of absence of four or under four weeks long. Women with a medium preference for maternity leave, for example, between four and ten weeks, find that the utility cost of a lower alternative wage is higher than the utility benefit of staying out of work for a longer time period, and so choose to take the leave of four weeks. Third, women who prefer a longer leave period will choose to quit their current job.

Suppose a leave is mandated that exceeds the employer's voluntary offer. The behavior of the first group of women will be unaffected because they prefer a leave under four weeks long. The second group who preferred a longer leave but chose the constrained four-week leave, will use the new mandate and will stay out of work longer. For the third group, two outcomes are possible. Some women will now choose to remain with the firm and take a leave of ten weeks. Others may still decide to leave the firm and stay out of work their preferred amount of time. Because the second group of women stays out longer, and some women in the third group choose to stay with the old employer, the theory predicts that maternity leave increases the number of women who are employed but on leave. The model also predicts that the average wage rate increases since more women are able to preserve firm-specific human capital by returning to their previous employer.

3.3 Second Order Effects

Mandated leaves may have additional negative effects on employment and wages by increasing the cost of female labour to employers. The direct costs include partial or full financing of the leave by the employer or indirect costs associated with a long absence, such as expenses related to hiring and training temporary replacements. These costs will cause a contraction in demand with final effects on employment and wages depending on the relative elasticity of supply and demand (Summers, 1989; Gruber, 1994).[3] Moreover, the direct labour supply effect may be reinforced by two selection mechanisms. First, as argued by Ruhm (1998), women that would not otherwise participate in the labour market may enter the labour market pre-birth to subsequently qualify for extended maternity leave. While this increases the aggregate employment, the average wage rate may fall because these women are likely to be less productive. Second, since income replacement is conditional on returning to the previous employer, women who value the income support will have a greater incentive to return to the labour market with a positive effect on employment. Lastly, if maternity leave legislation induces a new mother to take a considerably longer leave, her human capital will decrease as a result of a general deterioration of skills and a reduction in weeks of work experience, with a consequential negative effect on wages.

4. Empirical Evidence

Studies on maternity leave can be split into those that use between-country or within-country variation in intervention and those that attempt to quantify the causal effect of leave policies based on a single intervention such as the extension of leave policy.

In the analysis of the introduction of the Family Medical Leave Act in the US, Waldfogel (1999) employs a difference-in-difference-in-differences estimation method with the Current Population Survey data and does not detect any significant effect on women's wages or employment. The internal validity of this study may suffer, however, because men aged 19 to 45 and old women aged 46 to 60, the two main control groups used in the study, may not respond similarly to common labour market shocks in each state and time period as

[3] The direct costs are unlikely to be large in Canada where leave is funded through the Employment Insurance program and employer premiums were not raised post reform.

new mothers, violating the common trends assumption. In addition, Waldfogel (1999) uses a small sample size and fails to accurately identify those covered by the legislation. This provides one explanation for the statistically insignificant effects. Baum (2003) builds on this study using a larger dataset provided by the National Longitudinal Survey of Youth and focusing on women who are eligible for the mandate. He uses variation generated by partial state-level adoption of leave rights as well as the FMLA. He finds no significant effects of state leave rights on employment and wages using a variety of specifications and after controlling for selection bias. Even if this study is internally valid, it only has limited external validity because these results are difficult to generalise to other contexts given that job protected leave in the US is short – less than 3 moths with FMLA – and the population affected by FMLA only accounts for less than 50% of the private sector workers in the U.S.

In his influential paper, Ruhm (1998) uses aggregate data from OECD and examines the effect of the introduction of rights to paid leave on female wages and employment relative to men in sixteen European countries from 1969 to 1993. His analysis shows that short periods of paid leave entitlement lead to a 3 to 4 % rise in female employment rates, with little impact on wages, while longer entitlements lead to negligible additional impact on employment but significant negative impacts of about 3% on female wages. The rise in employment at short leave durations is consistent with the hypothesis that maternity leave improves labour market attachment by giving mothers the right to return to their pre-birth jobs, while the negative wage effect is in line with the loss of experience during lengthy absence periods, firms passing nonwage costs to employees or an outward shift in female labour supply. There are caveats to a causal interpretation of these results. Ruhm (1998) does not make a distinction between women with and without children so the employment estimates are likely to be biased upwards. Moreover, as noted by Ruhm (1998) the estimates will be biased upwards to the extent that the implementation of these policies is accompanied by other family-friendly policies, such as subsidized childcare.

Using micro-level data, Lalive and Zweimullier (2009) analyse the impact of the 1990 and 1996 parental leave reforms in Austria on return to work decision, employment, earnings and fertility. They find that extending paid leave from one to two years delays return to work of mothers and results in significant declines in employment and earnings in the first three years after birth. No detrimental effects on earnings and employment are found beyond three years. Exploring heterogeneous responses by income and occupation, the authors find that the reform affects employment and earnings of high and low-wage women to a similar extent, suggesting that cash transfers are less important. More white-collar than blue-collar workers

return to work, and short-run earnings and employment decline more for white-collar workers within the first three years, but not in the long run. This suggests that job-protection is more important for while-collar workers with higher firm-specific human capital than income replacement.

The absence of controls for education and marital status undermine the internal validity of this study. Although endogenous selection into control and treatment groups is unlikely because the comparison is between outcomes of mothers who gave birth in the month before the reform with those giving birth in the month after the reform, if these controls are omitted the conditional mean independence assumption may be violated as different trends in these variables for the control group and the treatment group may be driving post reform employment and wage differences, biasing the estimates. In addition, even though the comparison months are close, there are still seasonality effects that may confound the treatment effect, which authors fail to control for. Lastly, the study has only limited external validity because the effect of leave extension may differ across geographies, institutional settings and time periods.

Baker and Milligan (2008) study the short-term effects of the introduction and expansion of leave entitlements in all provinces of Canada from 1976 to 2000 and focus on the mother's behavior within the first year of life of the child. They find a strong significant increase in being employed and on leave, which is more than offset by a decrease in being employed and at work for longer leave entitlements. The external validity of this study may be limited, however, as their sample only includes women aged from 20 to 39. Moreover, the labour-leisure choices of females may be different in other countries.

5. Data and Empirical Strategy

5.1. Data

In order to identify the impact of maternity leave expansion and to define the control and the treatment group, I use data from the public files of the Survey of Labour and Income Dynamics (SLID) covering the period from 1996 to 2006. The SLID sample is composed of two rotating panels taken from the Labour Force Survey with each panel lasting six years. I do not have the unique family identifiers in the public use data so I treat the sample as a cross-section.

The SLID data was mainly selected due to its large sample. It contains household and individual level data for about 30,000 households and 60,000 individuals in each cross-section,

including, importantly, data on household and individual labour market income, experience, employment status, hours worked, and the age of the youngest person in the census family.

Two samples are created from this data: the first sample includes observations from 1999 and 2002, while the second sample spans 10 years from 1996 to 2006. For each year, the personal file and the census family file are merged to link all resident children to their mothers. I record any missing data, "Don't Know" answers and refused answers as missing as to remove the possibility of spurious results. I exclude from the analysis those who work for the federal government because these individuals are not subject to provincial labour laws. I group provinces into eight groups by combining Saskatchewan and British Columbia into the Western Region and Prince Edward Island and Nova Scotia into the Eastern Region.[4]

In order to estimate the average treatment effect (ATE) of the policy change my treatment group would ideally include women who have reported absence due to maternity leave since this identifies the receipt of the treatment. Unfortunately, public files of SLID do not provide information on leaves of absence. I therefore define my treatment group broadly as mothers with children less than two years old at the survey date. This group of women includes those who were employed and eligible for maternity leave and those who did not meet the provincial eligibility requirements, and thus, admittedly, constitutes an imprecise measure of those affected by the reform. One way to address this problem is to limit the sample to those mothers that have a job tenure that satisfies the required tenure listed in Table 1. However, the available data only provides information on job duration with the last employer which could introduce another form of selection bias into my treatment group: only those women who return to their previous employer would be analysed. I choose not to limit my sample in this way. Consequently, the regressions that follow represent Intent-To-Treat (ITT) analyses rather than the Average Treatment Effect (ATE) analyses.

As my control group, I use mothers with children aged 5 to 17 years in the reference year following Rossin-Slater et al. (2013). These women are believed to be comparable to the control group and are likely to respond to changes in economic conditions in the same way. One potential shortcoming associated with using this control group is the issue of group endogeneity. The maternity leave reform may affect the behaviour of mothers in the control group leading to the composition of the control group being different on average pre-reform and post-reform. For example, if those who are planning to have another child increase their

[4] The policy changes are of the same magnitude in the provinces combined.

labour supply post-reform to qualify for further maternity leave, then the estimated treatment effect in the employment regressions may be biased downward.

Hourly wages are obtained from the hourly wage reported (IMPHWE1). For respondents who report their wage or salary on another basis, SLID converts this amount to an hourly "implicit" rate based on usual hours per week, weeks per month and so on. All hourly figures are deflated using CPI figures with 1992 as the base year. Employment measure is constructed by generating a dummy variable that equals one if the respondent was employed in the reference year. Since those who are on maternity leave are counted as being employed, the employment measure does not distinguish between those who are employed and on leave and those who are employed and at work. I construct a measure of hours worked using the total hours at all jobs during the reference year to analyse the effect of maternity leave on the actual time spent at work.

Table 2 presents descriptive statistics for selected analysis variables for the treatment group and the control group for 1999 and 2002. Three categories of education are created with the omitted category being high school graduates or less. A marriage status dummy is created by grouping together the married and common law categories and letting divorced, widowed, separated, and single be the base group. Other demographic variables include years of work experience, family size and age. I also construct a dummy variable for receipt of employment insurance benefits as this affects the decision to work. In addition, I construct dummies for whether the job is full-time, or whether the individual is self-employed.

The table indicates that mothers with infants tend to be younger and more educated. Mothers with infants are less likely to work full-time and tend to have less experience. The age of mothers with infants somewhat rises from 1999 to 2002 as does their average experience. This suggests that changes in characteristics of mothers with infants relative to mothers with children between 5 and 17 could explain the two group's differing trends in employment rate, hourly wages and hours worked. In the regressions below I control for observable characteristics to make the two groups more comparable.

5.2. Empirical Strategy

The analysis of the impact of the 2000 reform on labour market outcomes is based on a difference-in-differences approach comparing changes in the outcome of interest for mothers of infants, surveyed in 1999 and 2001, relative to corresponding differences for the control

group unlikely to be affected by the reform. My primary econometric specification takes the form

$$Y_{igpt} = \beta_0 + \beta_1 POST_t + \beta_2 TREAT_g + \beta_3 D_{gt} + \beta_4 PROV_p + \gamma X_{igpt} + \varepsilon_{igpt} \quad (1)$$

where β_3 gives the DD estimator of the effect of maternity leave expansion on the treatment group, Y_{igpt} is the outcome of interest for individual *i* belonging to group *g* in province *p* in year *t* (the probability of being employed, log real hourly wage rate, log hours worked), $POST_t$ is a dummy variable equal to 1 if the individual was surveyed in 2002 and equal to 0 otherwise, $TREAT_g$ is a group-specific dummy variable, $D_{gt} = POST_t * TREAT_g$ is the intervention dummy, $PROV_p$ is a vector of province dummies, X_{igpt} is a vector of individual covariates. While I expect the reform to have a positive effect on hours worked, its effect on employment and wages is not clear a priory.

Since the 2000 reform resulted in varying treatment intensities across provinces, I can test the hypothesis that maternity leave has a different effect at different durations by extending the regression equation (1) as

$$Y_{igpt} = \beta_0 + \beta_1 POST_t + \beta_2 TREAT_g + \beta_3 D_{gt} + \beta_4 D_{gt}\, PROV_p + \beta_5 PROV_p + \gamma X_{igpt} + \varepsilon_{igpt} \quad (2)$$

where $D_{gt}\ PROV_p$ is a vector of interaction terms between the intervention dummy and province dummies. The province dummy for Alberta, the province with the largest leave expansion, is omitted to avoid the dummy variable trap. The coefficient β_3 now captures the treatment effect on the treatment group in Alberta, while β_4 captures the additional treatment effect associated with being a resident of one of the other seven provinces. I expect β_3 and β_4 to be significant if the leave expansion affected the outcome of interest and if this effect varied by province.

Specifications (1) and (2) assume that after controlling for observables, in the absence of the treatment, the treatment and the control group follow common time trends, and that the time-invariant group effect and the common time trends are the same across all provinces. However, some differences in employment rates, hours worked and hourly wages may be driven by second-order interactions between $POST$, $TREAT$ and $PROV$. For example, if market conditions differ across provinces or if there is a variation in time-invariant group effects. To account for the potential bias caused by omitting these interactions, I include all second-order

interactions in equation (2) and obtain a vector of difference-in-difference-in-difference estimators that capture the effect of the reform on the treatment group relative to the control group specific to a given province as in Gruber (1994).

The discrete specification above provides no information on the dynamics of the causal effect of the 2000 reform on the outcomes of interest. Using the sample from 1996 to 2006, I re-specify equation (2) allowing for lags and leads by interacting the intervention dummy with time dummies following Autor (2003)

$$Y_{igpt} = \beta_0 + \beta_1 YEAR_t + \beta_2 TREAT_g + \beta_3 D_{gt} + \sum_{\tau=0}^{m} \delta_{-\tau} D_{g,t-\tau} + \sum_{\tau=1}^{q} \delta_{+\tau} D_{g,t+\tau} + \gamma X_{igpt} + \varepsilon_{igpt} \quad (3)$$

where m is the number of years following the policy intervention and q is the number of years prior to the policy intervention. The pattern of coefficient estimates on leads serves as a falsification test of the common trends assumption. I expect the coefficients on leads to be zero if the outcome trends between the treatment and the control group are the same. I drop the one interaction for the last pre-treatment period to avoid the dummy variable trap. The coefficients on lags or posttreatment effects allow me to examine whether the causal effect of the leave extension grows, fades, or remains constant as time passes.

For ease of interpretation, the employment equations are estimated using the linear probability model. When non-linear DD models are used, the interpretation of interaction terms changes and the common trends assumption may be violated (Karaca-Mandic et al., 2012). The hours worked equations and the wage equations are estimated using the standard OLS.

6. Results

Table 3 presents results for the effect of the maternity leave expansion on employment. Column one illustrates the results using OLS on equation (1). I find that the leave expansion had a negligible effect on the treatment group relative to the control group. Column two adds a vector of interaction terms between the intervention dummy and province dummies, with $D * PROV$ represented in descending intensity of treatment. I find that the reform had a significantly lower employment effect in Western Region and Manitoba relative to Alberta. The Wald test for whether the sum of the coefficients on D and $D * Western\ Region$ and D $D * Manitoba,$ respectively, is zero does not reject the null hypotheses, suggesting that the overall effect of the reform on treatment groups in these two provinces is insignificant. The

coefficients on the intervention dummies for Western Region and Manitoba turn insignificant when bias related to province-specific group effects and province-specific time effects are controlled for in column three. One explanation of the insignificant employment results is that the expected positive employment effect due to the expansion of maternity leave is offset by the negative employment effect due to a leftward shift in demand for labour of women with infants.

The regression results for hours worked are presented in Table 4. As expected, maternity leave expansion reduces average hours worked by almost 15%. Adding a vector of interaction terms between the intervention dummy and province dummies increases the magnitude of the treatment effect to about 37% and shows that the treatment effect is similar in all provinces, expect Quebec. The Wald test for whether the sum of coefficients on D and $D * Quebec$ is zero rejects the null hypothesis at the 5% significance level, suggesting that the reform led to an increase in hours worked by the treatment group in Quebec. One explanation for this is that other child care related policies were implemented in Quebec in 2000 which may have affected hours worked of the treatment group. Alternatively, women with less labour force attachment might have moved to provinces where maternity leave extension took place and this could have driven the average hours worked up in Quebec. When all two-way interactions are included in column three, the coefficients on the intervention dummies for all provinces become insignificant. One explanation of this is that the significantly negative coefficients in columns one and two are driven by differing labour market conditions across provinces. It is important to note, however, that including all two-way interactions increases standard errors and it could be that the insignificant results in column three are driven by the power of t-tests being low. While equation (3) is informative, equation (2) provides the preferred specification.

Results for hourly wages are found in Table 5. DD specifications (1) and (2) show that the lengthening of maternity leave had a negligible effect on hourly wages. When a full set of two-way interactions is added, the effect of leave expansion on wages of the treatment group relative to the control group in Alberta becomes significant at the 5% level. The Wald test for whether the sum of the coefficient on D and $D * New\ Brunswick$, D and $D * Western\ Region$, D and $D * Manitoba$, D and $D * Eastern\ Region$, and D and $D * Quebec$ is zero does not reject the null hypothesis at the 5% significance level in column three. This suggests that the maternity leave expansion had no effect on wages of the treatment group in all provinces, except Alberta.

Table 6 shows the results obtained from equation (3) for employment, hours worked and hourly wages. As expected, I find that coefficients on leads in the hours worked and hourly wages equations are zero. This validates the common trends assumption. For the employment equation, an anticipatory effect in observed in 1999.

The regression coefficients on the lags show the dynamic effects of the policy change. The equation for hours worked looks especially convincing - the treatment effect comes into effect exactly after the maternity leave expansion and the negative effect on average hours worked persists for at least five years. This specification does not impose any assumptions about functional form and provides convincing evidence that most women prefer to take extended maternity leave provided that their job remains protected.

7. Conclusions

7.1. Evaluation and Further Research

The above analysis provides new evidence regarding the effect of maternity leave on employment, hours worked and hourly wages. However, there remains much scope for improvement. First, the cross-sectional structure of the dataset used in the analysis does not provide information on work-life histories. Having access to the panel structure of the data set through the master files would enable a better identification of those women affected by the maternity leave expansion. Moreover, it would allow one to follow the treatment group through time, making it possible to examine whether the treatment effect diminishes in years after birth. Second, the analysis above assumes that individuals do not move provinces as a result of the policy change. This may not hold true in reality. Third, it is important to note that although eligibility requirements for maternity leave and income support are different in Canada, it is possible that the negative effect on hours worked is driven primarily by the fact that mothers are able to afford to stay out of work for a longer period of time due to income support that they can claim. Thus, an extension of this paper would be to analyse the mechanisms through which the effects on labour market outcomes operate, specifically, in the context of Canada.

7.2 Policy Implications

My findings suggest that the 2000 expansion of maternity leave in Canada had a small and statistically insignificant effect on the probability of a new mother being employed and on

hourly wages, but a negative persistent effect on average annual hours worked by new mothers relative to women with older children. These results are comparable to those found in the literature on maternity leaves of moderate durations (Ruhm, 1998; Baker and Milligan, 2008).

Canada's maternity leave system is an example of one of the most efficient government leave programs. This paper suggests that precisely this structure of maternity leave achieves the policy objective of allowing new mothers to spend a sufficient amount of time with their child, and thus optimise the health benefits to their child, while at the same time preserving their job-match and career prospects. The results also show that, counterintuitively, the expansion intensity does not play a large role in determining aggregate effects on hours worked, but is important for hourly wages. This finding suggests that the functional relationship between annual hours worked and mandated maternity leave is not continuous but resembles a step function whereby at moderate durations of leave the treatment effect is constant. While this study is suggestive about how a similar expansion of maternity leave may affect female labour market outcomes, its external validity may be limited due to differences in preferences and institutional settings across countries.

8. Appendix

Table 1: Extension of Maternity Leave Starting in 2000

Province	Total Weeks of Leave Prereform	Total Weeks of Leave Postreform	Change	Date of Extension	Tenure Required
Quebec	70	70	0	No change	n/a
Ontario	35	52	17	Dec. 31, 2000	13 weeks
Nova Scotia	34	52	18	Dec. 31, 2000	1 year
Prince Edward Island	34	52	18	Dec. 31, 2000	20 weeks
Manitoba	34	54	20	Dec. 31, 2000	28 weeks
British Columbia	30	52	22	Dec. 31, 2000	n/a
Saskatchewan	30	52	22	June 14, 2001	20 weeks
Newfoundland	29	52	23	Dec. 31, 2000	20 weeks
New Brunswick	29	54	25	Dec. 31, 2000	n/a
Alberta	18	52	34	Feb. 7, 2001	1 year

Source: Baker and Milligan (2008)

Table 2: Descriptive Statistics for Selected Analysis Variables

	Treatment: Mothers of Youngest Child Aged <2				Control: Mothers of Youngest Child Aged 5-17			
	1999 (N=1076)		2002 (N=911)		1999 (N=4013)		2002 (N=3261)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Employed	0.42	0.494	0.454	0.498	0.569	0.495	0.600	0.490
Hourly Wage	12.279	6.55	13.377	9.153	11.618	6.055	11.942	6.910
Hours Worked	713.332	818.825	755.73	813.438	1126.220	909.480	1233.374	921.115
Age	29.971	5.314	30.327	5.293	36.285	7.031	36.498	7.206
High School	0.833	0.373	0.841	0.366	0.757	0.429	0.795	0.404
Some College	0.293	0.455	0.323	0.468	0.218	0.413	0.223	0.416
University Degree	0.199	0.399	0.23	0.421	0.106	0.308	0.114	0.317
Married	0.896	0.305	0.897	0.303	0.722	0.448	0.703	0.457
Work Experience	6.582	5.708	6.71	5.547	10.070	7.905	10.081	8.182
Family Size	3.836	1.02	3.777	0.983	3.894	1.015	3.880	0.997
EI Benefits	0.371	0.483	0.535	0.499	0.100	0.300	0.114	0.318
Full-Time Worker	0.4	0.49	0.453	0.498	0.528	0.499	0.584	0.493
Self-Employed	0.095	0.293	0.091	0.288	0.107	0.309	0.110	0.313

Notes: All statistics are weighted by the SLID person weights. Descriptive statistics for hourly wages and hours worked are calculated conditional on hours worked being positive.

Table 3: LPM estimates of the effect of maternity leave expansion on employment

	DD				(3)	
	(1)		(2)			
	Coef	Std.Err	Coef	Std.Err	Coef	Std.Err
D	0.0198	(0.0238)	0.0513	(0.0538)	0.0818	(0.0764)
D*New Brunswick	-	-	-0.0198	(0.0914)	-0.1578	(0.1301)
D*Newfoundland	-	-	0.1138	(0.0960)	-0.1734	(0.1408)
D*Western Region	-	-	-0.1314**	(0.0651)	-0.0760	(0.0961)
D*Manitoba	-	-	-0.1724**	(0.0770)	-0.1366	(0.1151)
D*Eastern Region	-	-	-0.0244	(0.0753)	-0.0177	(0.1090)
D*Ontario	-	-	0.0045	(0.0592)	-0.0110	(0.0875)
D*Quebec	-	-	0.0089	(0.0649)	-0.0777	(0.0950)
PROV* POST	No		No		Yes	
PROV* TREAT	No		No		Yes	
Adjusted R Squared	0.1644		0.1654		0.1670	

Notes: (1) Robust standard errors in parentheses. (2) *** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance at 10% level. (3) Each model includes dummies for time, province and treatment group. Additional controls are age, education dummy variables, years of work experience, family size, dummy variables for being married and receiving EI benefits. (4) There are 9,261 observations in the employment models.

Table 4: OLS estimates of the effect of maternity leave expansion on hours worked

	DD				DDD	
	(1)		(2)		(3)	
	Coef	Std.Err	Coef	Std.Err	Coef	Std.Err
D	-0.1487**	(0.0615)	-0.3671**	(0.1805)	-0.2811	(0.2232)
D*New Brunswick	-	-	0.3081	(0.3055)	0.2220	(0.3839)
D*Newfoundland	-	-	0.2129	(0.3178)	-0.2854	(0.3993)
D*Western Region	-	-	0.1364	(0.2012)	0.2909	(0.2779)
D*Manitoba	-	-	-0.0493	(0.2583)	-0.0595	(0.3193)
D*Eastern Region	-	-	0.2463	(0.2257)	0.0793	(0.2824)
D*Ontario	-	-	0.2273	(0.1917)	0.1081	(0.2433)
D*Quebec	-	-	0.5105**	(0.1983)	0.3259	(0.2631)
PROV* POST	No		No		Yes	
PROV* TREAT	No		No		Yes	
Adjusted R Squared	0.3065		0.3083		0.3093	

Notes: (1) Robust standard errors in parentheses. (2) *** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance at 10% level. (3) Each model includes controls include in Table 3 as well as dummies for self-employed status and being a full-time worker. (4) The models are estimated conditional on hours worked being positive. (5) There are 6,886 observations in the hours worked models.

Table 5: OLS estimates of the effect of maternity leave expansion on hourly wages

	DD				DDD	
	(1)		(2)		(3)	
	Coef	Std.Err	Coef	Std.Err	Coef	Std.Err
D	0.0066	(0.0258)	0.1015	(0.0693)	0.2102**	(0.0958)
D*New Brunswick	-	-	-0.1727**	(0.0855)	-0.3776***	(0.1288)
D*Newfoundland	-	-	0.1126	(0.1312)	0.0031	(0.1750)
D*Western Region	-	-	-0.1860**	(0.0786)	-0.2722**	(0.1153)
D*Manitoba	-	-	-0.1468*	(0.0864)	-0.2270*	(0.1274)
D*Eastern Region	-	-	-0.1997**	(0.0879)	-0.2822**	(0.1228)
D*Ontario	-	-	-0.0263	(0.0748)	-0.1560	(0.1066)
D*Quebec	-	-	-0.1676**	(0.0791)	-0.3093***	(0.1128)
PROV* POST	No		No		Yes	
PROV* TREAT	No		No		Yes	
Adjusted R Squared	0.3537		0.3558		0.3555	

Notes: (1) Robust standard errors in parentheses. (2) *** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance at 10% level. (3) Additional controls include those in Table 3 as well as self-employed status and full-time worker dummy variables. (4) The models are estimated conditional on hours worked being positive. (5) There are 6,886 observations in the hours worked models.

Table 6: Dynamic effect of maternity leave expansion, 1996-2006

	Employment		Log Hours Worked		Log Hourly Wage	
	(1)		(2)		(3)	
	Coef	Std.Err	Coef	Std.Err	Coef	Std.Err
D_{1997}	0.0108	(0.0208)	0.0340	(0.0470)	-0.0085	(0.0233)
D_{1998}	-0.0008	(0.0213)	0.0269	(0.0485)	-0.0336	(0.0225)
D_{1999}	-0.0446**	(0.0213)	0.0011	(0.0521)	0.0207	(0.0232)
D_{2000}	-0.0145	(0.0222)	0.0154	(0.0510)	0.0293	(0.0251)
D_{2001}	0.0321	(0.0231)	-0.0730	(0.0525)	0.0092	(0.0258)
D_{2002}	-0.0236	(0.0227)	-0.1485***	(0.0575)	0.0261	(0.0249)
D_{2003}	0.0270	(0.0235)	-0.1130**	(0.0536)	0.0308	(0.0245)
D_{2004}	0.0177	(0.0241)	-0.1442***	(0.0543)	0.0585**	(0.0254)
D_{2005}	-0.0213	(0.0237)	-0.0896	(0.0547)	0.0379	(0.0247)
D_{2006}	-0.0088	(0.0237)	-0.1725***	(0.0556)	0.0082	(0.0251)
Observations	48,532		36,737		32,283	
Adjusted R Squared	0.1773		0.3017		0.1687	

Notes: (1) Robust standard errors in parentheses. (2) *** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance at 10% level. (3) For controls included in (1), (2) and (3) see Table 3, Table 4 and Table 5, respectively.

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