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Chercheur principal

Philip J. Merrigan, Université du Québec à Montréal

Cochercheurs

Pierre Lefebvre, Université du Québec à Montréal

Catherine Haeck, Université du Québec à Montréal

Nancy E. Mayo, Université McGill

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Universal childcare and long-term effects on child well-being : Evidence from Canada

Laëtitia Lebihan, Catherine Haeck and Philip Merrigan

Starting in 1997, the Canadian province of Quebec implemented a $5 per day universal childcare policy for children under 5 years old. This reform significantly increased mothers' participation in the labor market as well as the proportion of children attending subsidized childcare. In this paper, we evaluate the long-term effects of the policy on child well-being (health, behavior, motor and social development) using data from the National Longitudinal Survey of Children and Youth. We follow treated children for more than 9 years and investigate the impact well beyond the first few years of the policy. A nonexperimental evaluation framework based on multiple pre- and posttreatment periods is used to estimate the policy effects. We show that the reform had negative effects on preschool children's well-being, but these effects tend to disappear as the child gets older. We find that this pattern persists even 10 years after the implementation of the reform.

Key words : universal childcare, child well-being, childcare policy, natural experiment.

JEL Classification : J13, J18, I31, I20

1 Introduction

To meet the increased demand for childcare and promote children's development, policymakers in many countries have implemented subsidized childcare programs. Evidence showing that early childhood interventions have higher economic returns than interventions later in life (Heckman, 2006) supported this type of family oriented policies. However, much of this evidence relates to targeted early childhood interventions [1] and may not be generalizable to universal childcare policies. In fact, recent studies on the effect of universal childcare on children's outcomes find mixed results. [2]

One of the most well-known universal childcare programs in North America is from the Canadian province of Quebec. This program was initiated in 1997 and was highly subsidized. Childcare spaces were provided at a single low-fee of $5 per child per day ($7 as of 2004). The reform was phased in by age group, starting with 4-year-olds in 1997 and ending with 0–1-year-olds in 2000. Although the Quebec government intended to provide regulated and subsidized childcare spaces for all children not yet eligible for publicly provided kindergarten, the number of spaces in 2000 remained constrained. Over time, the constraint was eventually lifted and, by 2006, the number of spaces in the network became stable (Haeck et al., 2015).

The policy had two major objectives : (1) increase mothers' participation in the labor market, and (2) enhance child development and equality of opportunities. A number of studies showed that the first objective was met (Lefebvre and Merrigan, 2008 ; Baker et al., 2008 ; Kottelenberg et al., 2013 ; Haeck et al., 2015). Together, these studies showed

1. For example, the Perry Preschool Program and the Abecedarian Project. See also Almond and Currie (2010) for a review.

2. For example, Baker et al. (2008), Haeck et al. (2015) and Kottelenberg et al. (2013) reported negative impacts on child development and behavior outcomes. Datta Gupta and Simonsen (2010) found that preschool had little effect on future noncognitive outcomes but enrollment in family daycare had negative effects for boys with low maternal education. Havnes and Mogstad (2011) and Felfe et al. (2015) reported positive impacts on children's long-run outcomes as teenagers and adults.

a large and lasting positive effect of the reform on maternal labor supply and childcare utilization. In contrast, studies on the effect of the reform on child development seriously questioned the alleged benefit of the reform for children. In a seminal paper Baker et al. (2008) – henceforth BGM [3] – showed that the reform had negative effects on children's health, behavior and motor-social skills before age 5. They also found negative effects of the policy on measures of parental effectiveness and family functioning. However, these results were obtained with only a few postpolicy years reflecting the early years of the program. Because of this, longer-term impacts of the policy are not addressed by the paper.

We extend their research on universal childcare in two ways. First, we estimate the impact of the Quebec childcare reform on eligible children beyond the preschool period. Analyzing the impact of the policy on children aged 5–9-years-old eligible for low-fee childcare since birth allows us to study the long-term effects of the policy on children who were highly exposed to the reform. Negative impacts documented by BGM on health, cognitive and behavioral development in the preschool years may have persisted once children entered school. Or, they may not persist in the long run. For example, it is possible that exposure to childcare early on reinforced the development of the immune system [4] such that the negative health effects documented in BGM may have turned positive during the school years. [5] Documenting the long-term effects of universal childcare on eligible children is crucial to our understanding of the overall impact of such programs, yet few studies do so using a quasi-experimental design. Datta Gupta

3. BGM has been cited over 500 times.

4. See for example the hygiene hypothesis that states that a lack of early childhood exposure to infectious diseases may weaken the natural development of the immune system (e.g. Strachan, 2000).

5. A large literature documents the increased risk of infections in large daycare settings for children aged 0–3 years old. This finding is generally attributed to increased germ exposition in a group setting and the immaturity of the immune system at this age. These effects appear to be short-lived, however, and may even reverse once children start formal schooling around ages 5 to 6 (Côté et al., 2010 ; Raynault et al., 2011.)

and Simonsen (2010, 2015) are an exception. These authors found that preschool had little effect on noncognitive outcomes, as well as mathematics, at age 7, but that it improved student's test scores in Danish.

Second, we estimate the impact of the reform over a longer observation period than BGM – 6 years after the period available to BGM. In practice BGM captured the short-term effects of the reform up to 2003. At the time of their study few treated 4-year-olds were eligible for low-fee childcare since birth. Because the number of spaces increased rapidly until 2006, the estimated short-term impacts in BGM may reflect not only the impact of childcare per se but also that of the overall adjustment to a new social norm and the rapid deployment of a large scale childcare network. As the network stabilizes, the effects may be different. Kottelenberg and Lehrer (2013) and Baker, Gruber and Milligan (2015) extended the observation period to 2007 but estimated the average effect of the reform on all treated children irrespective of the treatment period. Our empirical strategy allows us to measure whether the effects found in previous research are transitional or persist over time.

We use all available 8 biennial waves of Statistics Canada's National Longitudinal Survey of Children and Youth (NLSCY) data (1994 to 2009). Children surveyed in the NLSCY constitute a representative sample of the population of Canadian children. A nonexperimental evaluation framework based on multiple pre- and posttreatment periods is used to estimate the policy effects. Effectively, we compare Quebec children before and after the reform to comparable children in the Rest of Canada (RofC).

Our estimates suggest that the reform had negative effects on preschool children's health, motor-social development and behavior up to 2007, 10 years after the implementation of the reform. However, our estimates by wave suggest that the effects become smaller over time and eventually become statistically insignificant by 2009. Also, as children get older, most negative effects tend to disappear. One exception is the negative

impact by way of an increase in on emotional disorder that seems to persist even when the child enters school. Finally, regardless of age, the negative effects of the reform on child well-being are mainly driven by children of highly educated mothers.

This paper is structured as follow. Section 2 describes Quebec's family policy. The data set used is presented in Section 3. Section 4 describes the methodology. Empirical results are presented in Section 5. Section 6 concludes the paper.

2 Daycare reform in Quebec [6]

In the late 1990s, the government of Quebec initiated the gradual implementation of a low-fee childcare network for children under 5 years old. The low-fee childcare spaces had a single price : $5 per day per child. On September 1, 1997, only 4-year-olds were eligible for low-fee spaces. On September 1, 1998, the 3-year-olds became eligible for subsidized childcare. They were followed by the 2-year-olds on September 1, 1999. Finally, on September 1, 2000, all children aged less than 59 months – not entitled to kindergarten because their fifth birthday is after September 30 – became eligible for subsidized childcare. While all children were eligible, the number of available spaces at the time still did not meet the demand for spaces. Between 2000 and 2012, the number of low-fee spaces increased from 85,000 to 217,000 spaces and thereby released the capacity constraint. In 2004, the price of low-fee childcare increased from $5 to $7 per day per child. Overall the total number of regulated spaces in Quebec more than tripled between 1996 and 2013 from 78,864 to 258,366 regulated spaces, and the total government subsidy reached 2.3 billion dollars for fiscal year 2012-2013 (Conseil du Trésor -Quebec, Budget 2012-2013). In contrast, the number of subsidized childcare spaces in the other Canadian provinces was relatively small compared with the province

6. For a more precise description of the reform up until 2008 see Haeck et al. (2015).

of Quebec and changed little between 1997 and 2009 (Haeck et al., 2015). This reform drastically changed the way in which preschool children were cared for in Quebec, while no comparable changes were observed elsewhere in Canada. Figure 1 presents the mean hours (conditional and nonconditional on the use of childcare) per week that children aged 1-4 years old spent in their primary care arrangement in Quebec and the RofC. Haeck et al. (2015) show not only that more children started to attend daycare in Quebec following the reform, but that the intensity of care for those attending daycare also increased. In contrast, no significant changes in the hours of care has occurred in the RofC.

The daycare reform pursued two objectives : (1) increasing mothers' labor force participation, while balancing the needs of workplace and home ; and (2) enhancing child development and equality of opportunities. The first objective has been studied extensively in the literature. Lefebvre and Merrigan (2008), BGM, Kottelenberg et al. (2013), and Haeck et al. (2015) together show large and lasting positive effects on maternal labor supply and childcare utilization. Results on child development are less conclusive. The impact on children likely depends on the quality of care provided, the intensity of care, the age of the child in care and family background. The network mainly consisted and still consists of two modes of care : center-based and home-based. Both were regulated by the government and had to follow new standards with regards to the number of children to educator ratio and a regulated educational program. Center-based facilities additionally had to employ a certain number of qualified employees. Even so, two major studies evaluating the quality in the early years of the program (ISQ, 2004 ; Japel et al., 2005) found that the average quality was at best satisfactory and in many cases low or not acceptable, particularly for children in lower-income families.

Along with low-fee childcare, the reform implemented changes for school-age children. First, full-day kindergarten replaced half-day kindergarten for 5 year olds in school

as of September 1998. Second, before- and after-school daycare were now also offered to children at ages 5-12 on the school premises – also at the low-fee of $5 per day per child and $7 as of 2004. But, past research referred to above, clearly demonstrated that the main impacts on children and mothers come from the daycare policy.

3 Data

To estimate the long-term impacts of the reform on children, we use the National Longitudinal Survey Children and Youth (NLSCY). The NLSCY is a long-term biennial survey designed to measure the well-being of Canadian children. The survey started in 1994–1995 (wave 1) and ended in 2008–2009 (wave 8). This implies that we can observe young children in Canada 4 years prior to the implementation of the reform and for more than 10 years after. In the NLSCY, we can observe children aged 0–9 years old throughout the period.

Given the policy phase-in, children of different age group were treated differently by the policy over the years. Table 1 summarizes the various treatment by age group by presenting the eligibility of children according to their age and NLSCY wave. The gray-shaded area highlights the postreform years while the unshaded area refers to the prereform years. Numbers indicate the number of years of eligibility for low-fee childcare. The reference point is always December 31 of the first year[7] for each of the 8 waves. For example, for wave 4 (2000–2001), the reference point is the child's age on December 31, 2000. The index 0.5 refers to the fact that children were eligible for only a few months, not even a full year. The term "n.a" (not available) implies that although children were eligible for low-fee childcare, data for this age group in the wave

7. The NLSCY surveys are conducted over a few months and start in the fall of the first year of the two-year period. For example, in wave 4 (2000–2001), data collection started in September 2000 and ended in April 2001.

is not available in the NLSCY. For our main results, we exclude data from waves in which children were either not treated at all or treated minimally by the reform. More specifically, we exclude wave 3 data for the 0–6-year-old subgroup [8] and wave 4 data for the 7–9-year-old subgroup. This approach is also supported by the fact that the number of regulated childcare spaces did not change in the early years of the reform (before 1999). In the early years, existing spaces were converted to low-fee spaces (see Figure A.1 in Haeck et al., 2015). We verify the robustness of our results to this restriction in the empirical section.

Table 1 clearly shows that the number of years in low-fee childcare increased over time. Indeed, children aged 0–4 years in BGM were treated for only a few months to 2 years (waves 4 and 5). In this study, we add an additional 6 years of data and we also observe school-age children. This allows us to study the effects on preschoolers over a longer period. It also enables us to analyze the long term impacts of the reform on school-age children (aged 5 to 9 years old). In both groups, we can now observe children that were eligible to low-fee childcare since birth and were therefore highly exposed to the reform (up to 5 years of treatment).

To measure the effect of subsidized childcare on child health the following dummy outcomes variables are constructed : (1) excellent child health in general ; (2) child injury requiring medical attention in the past 12 months ; (3) asthma attack in the past 12 months ; (4) never had a nose or throat infection ; and (5) never had an ear infection. All health outcomes are reported by the person most knowledgeable about the child – almost always the mother – and are available for children aged 0–9 years old. One exception is nose/throat and ear infections that are only available for children aged 0–3 years old.

As to motor and social development, we use the normalized Motor and Social Deve-

8. BGM also exclude wave 3 data in their analysis on preschoolers.

lopment (MSD) score available in the NLSCY for children aged 0-47 months old. This score is used to measure fine and gross motor skills, perception and cognitive skills, communication and language, and the social development of children.

Children's behavioral measures vary by age group. For the 2–3-year-olds, four parent-reported measures are available : (1) a hyperactivity-inattention score ; (2) an emotional problems and anxiety score ; (3) a physical aggression and opposition score ; and (4) a separation and anxiety score. For the 4–9-year-olds, four parent-reported measures of behavior are available : (1) a hyperactivity-inattention score ; (2) an emotional problems and anxiety score ; (3) a physical aggression and conduct problems score ; and (4) an indirect aggression score. Although the measures may seem identical, the subquestions differ slightly by age group and over the cycles. To ensure comparability over time, we have harmonized the measures such that they are perfectly comparable over time and follow the definitions used by Statistics Canada as of cycle 4. The subquestions used for each measure are reported in Table A.1. For each of the behavioral scores, a higher score indicates the increased presence of behavioral disorder.

A number of control variables are available using the NLSCY. We use the sex of the child ; the mother and father's highest level of education — less than a high school diploma, high school diploma, some postsecondary education, with postsecondary diploma (omitted) ; the age group of the mother and father at child's birth — 14–24 years old (omitted), 25–29, 30–34, 35 or more ; a dummy for whether the mother or father was born in Canada or not ; the size of the area of residence — five groups from rural to 500,000, or more (omitted) ; the presence of older children — no older child (omitted), one older child, at least two older children ; the presence of younger children — no younger child (omitted), one younger child, at least two younger children ; the presence of children of the same age ; and dummy variables for the age of the child. Summary statistics for children aged 0–9 years old in Quebec and the RofC pre- and postreform

are presented in Table A.2.

4 Empirical strategy

To estimate the long-term effects of subsidized childcare we use a nonexperimental evaluation framework based on multiple pre- and posttreatment periods. We have two groups (Quebec and the RofC) observed before and after the policy, but only Quebec children are affected by the reform. The treatment group includes Quebec's children before and after the reform, and the control group includes children of the same age in the RofC observed in the same year. Periods of pre- and posttreatment depend on the age of the child (see Table 1). To account for the gradual implementation of the policy, we allow the effects of treatment to differ in each of the postreform waves. The empirical model is as follows :

$$Y_{ij} = \alpha + \theta Q_{ij} + \sum_{j=1}^{8} \gamma_j D_j + \sum_{j=c}^{8} \beta_j W_j Q_{ij} + \Phi X_{ij} + \varepsilon_{ij} \tag{1}$$

where Y_{ij} represents the outcome of child i in wave j. Outcomes studied here are child health, behavior and motor-social development. The term Q_{ij} is a dummy variable taking the value 1 if the child i lives in Quebec in wave j and 0 otherwise. The wave dummies D_j capture aggregate effects common to all children in Canada. To account for phase-in by age of the policy, a set of dummies W_j for each of the postreform waves interacted with Q_{ij} is included. The terms W_j take the value of 1 if the wave is greater than or equal to $c = 4$ for children 0–6 years old, and $c = 5$ for children 7–9 years old (see Table 1). The term X_{ij} is a vector of socioeconomic control variables and ε_{ij} is an error term.

Our standard errors are estimated using the 1,000 bootstrap weights provided by Statistics Canada. This procedure accounts for the complex survey design of the NLSCY.

Because we estimate impacts for multiple outcomes at the same time, we also adjust our p-values following Simes (1986). This correction assumes that our outcomes are correlated with one another and avoids the possibility of overrejecting the null hypothesis when studying multiple correlated outcomes.

Our empirical strategy relies on two critical assumptions. First, in the absence of the reform, outcomes of Quebec and RofC children would have followed a similar trend. We cannot observe untreated children in Quebec postreform, but we can observe trends in the outcome variables in the treatment and control group prior to the reform. Figure 2 shows the evolution of a few outcome variables pre- and posttreatment. The dashed area is the phase-in of the program (wave 3 for the 0 to 6 year olds and wave 4 for the 7 to 9 year olds). Prior to the reform, the trends are very similar. Other threats to this assumption are shocks impacting the outcome of one group but not that of the other during our observation period. Canada-wide policies are common to both groups and therefore unlikely to affect them differently. Province specific policies are, however, a serious concern. In Quebec, three reforms were implemented during the period we observe. First, in July 1997, universal nontaxable family allowances were replaced by a tax benefit contingent on family income as well as family status. Second, in January 2005, the Quebec government implemented a new working income supplement to low-income households (mostly favoring single-parent families working near the minimum wage) (Haeck et al., 2015). Hence, benefits for single mothers show much more provincial variation than those for two-parent families (BGM). Following BGM, we focus on two-parent families to avoid interference with other policies targeting low-income families. Third, Quebec implemented a comprehensive school reform starting in 2000 and phased-in over the years across grades. Haeck et al. (2014) show that the reform had a negative impact on the mathematic scores of children. For children in school, we therefore focus exclusively on health and behavioral outcomes not impacted by the school reform. Even

so, for older children in school, our treatment group includes children treated by the Quebec school reform.

Second, our approach assumes no selection based on province-specific transitory shocks. First, when the policy was announced, ineligible children were already born. Parents could not have delayed conception to be eligible. Second, although parents outside of Quebec could have moved to Quebec to benefit from the childcare reform, migration data does not support this idea (for more details, see Lefebvre et al., 2009).

5 Econometric results

We estimate the policy effects for three age groups separately : 0–5-year-olds not yet in school, 5–6-year-olds in school, and 7–9-year-olds. This allows us to estimate the contemporary effect of the reform on preschool children, and the spillover effects into the school years. We first present the effects of the reform on children's well-being for the full sample (two-parent families). Then, we analyze the effects of the reform by maternal education. We present the estimates per wave, $\beta_4 - \beta_8$ in the tables, along with the average effect over the entire postreform period β_{4-8}.

In Tables 2 to 5, we report the coefficients, standard errors and the significance level (indexed by $\star$). For reasons of clarity and space, we only report the significance level (indexed by †)of the results using the adjusted p-values [9] (Simes, 1986). To ease interpretation of our results, all nonbinary outcomes were restandardized for all respondents to have a mean of zero and a standard deviation (SD) of one. The coefficients can thus be interpreted in terms of changes in standard deviations.

Estimated effects for the full sample Table 2 presents the estimated effects of the subsidized childcare policy on children's health, motor-social development and behavior

9. The adjusted p-values are available from the authors upon request.

for the 0–5-year-olds not yet in school. The results for children aged 5–6 years old in school and 7–9 years old are presented in Table 3.

Unadjusted results (indexed by $\star$) show that the reform has an average negative impact on children outcomes aged 0 to 5 not in school (Table 2). The results are robust if we adjust the p-values for the multiple outcomes to reduce the likelihood of making Type I errors (results indexed by †). When we let the policy effects vary by wave, we find that the effects are not generally persistent over time. In fact, most effects are significant only for waves 4 to 7. By wave 8, we find the following : the policy still increases infections (nose/throat and ear) ; for the 2–3-year-olds the policy increases physical aggression ; and for the 4–5-year-olds the policy increases anxiety. However, once we adjust the p-values for multiple outcomes, only the impact on nose/throat infections persists. Taken together, our estimates by wave suggest that the policy effects become smaller over time and eventually become insignificant by 2008–2009 (Table 2).

We turn to the results for children aged 5–6 and 7–9 (Table 3) who are in school. These are the first empirical results on the effects of the Quebec's universal childcare policy on these age groups. Most negative effects of the policy on child outcomes found in the preschool period disappear once children are in school. Indeed, for children aged 5–6 years old who are in school, the reform has no persistent negative effect on their health. We observe some positive effects on the probability of being injured, but they are not significant once we adjust our p-values to multiple outcomes. For the behavior of children aged 5–6 years old who are in school, the effects of the policy are also generally not significant (results indexed by †), except for hyperactivity in wave 8 at 33.4% of an SD. How material is this effect ? The measured effect would imply that mothers postreform changed their answers from "Never or not true" to "Sometimes or somewhat true" to one of the seven questions about hyperactive behavior. This is hardly a large behavioral impact, even if statistically significant.

Concerning children aged 7 to 9, the policy has no lasting impact on health. Similarly, for behavioral outcomes, most effects of the reform are insignificant. Only emotional disorder and anxiety are significant and persist throughout the period (but the pattern is not as clear once we adjust the p-values). Indeed, the effects on emotional disorder and anxiety are around 13.2% of an SD for the 2–3-year-olds, 37.8% of an SD for the 4–5-year-olds, 17.3% of an SD for the 5–6 year-olds, and 22.4% of an SD for the 7–9-year-olds. This suggests that the effect on emotional behavior decreases in magnitude when the child is in school. Once the child is in school, the effects are also relatively small. To illustrate our point, the effects measured on school age children could be triggered by one in two mothers changing their answers to one of the seven questions about emotional behavior from "Never or not true" to "Sometimes or somewhat true".

To consolidate our results, we present figures by age for three of our main outcomes : never nose or throat infections, hyperactivity-inattention, and emotional disorder-anxiety (Figure 2). The paths of these outcomes in Quebec and the RofC are similar prior to the introduction of the policy – regardless of the age of the child. However, after wave 3, we observe for preschoolers (0–5 years old and not in school) an increase in hyperactivity and emotional disorder scores in Quebec, as well as a growing gap between Quebec and the RofC for the absence of nose/throat infections. For children 5–6 years old in school, behavioral scores between Quebec and the RofC evolve similarly, and the gap grows after wave 6. For children 7–9 years old, the trajectories of the two groups move in the same direction for the hyperactivity score throughout the period. However, for the emotional disorder outcome, there is a sizable relative rise in Quebec after wave 4. The graphs are consistent with the estimated effects above.

We also performed a number of robustness checks but found that our results were extremely stable. We included wave 3 data for the 0–6-year-olds, included wave 4 data for the 7–9-year-olds, added linear time trends, and moved children impacted by the

school reform into the prereform group. None of these changes mattered.

In sum, it appears the vast majority of the negative effects documented for younger children do not persist once they enter school. Over time, only the impact on emotional disorder and anxiety persists, but the effects are rather small. Consistent with the implementation of the reforms, these effects occur for children treated more intensely in the early years of the reform (the 4–5-year-olds in waves 6 and 7 observed in school in waves 7 and 8). Finally, when we focus on the preschoolers, our estimates suggest that the adverse effects documented early on faded away as of 2008. Unfortunately, we do not observe these children in school later on. Clearly, the reform did not benefit children on average in Quebec but it did not harm them either.

Estimated effects by mother's education In this section, we investigate whether the estimated effects differ according to maternal education. We divide our sample in two groups : (1) children with high-school educated mothers (low education) ; and (2) with postsecondary educated mothers (high education). Tables 4 and 5 show the estimated effects – for children aged 0–5 years old who are not in school, and children aged 5–9 years old who are in school – by maternal education.

Regardless of age, the negative effects of the reform on child well-being are mainly driven by children of highly educated mothers. Indeed, for children aged 0–5 years old who are not in school and whose mothers have a high education level, the reform has negative impacts on nose/throat and ear infections, on the MSD score, and on several behavioral scores. In contrast with children whose mothers have a low education level, only effects on nose/throat infections, physical aggression at 2–3 years old and emotional disorders at 4–5 years old are significant (Table 4). Again, our estimates by wave also suggest that, for all children, the effects become smaller over time and eventually become insignificant by wave 8 (Table 4).

For children aged 5–6 years old who are in school, the policy has no major significant effect on the children's well-being both for children of high-educated mothers and for children of low-educated mothers (Table 5). If we simply take into account the signs of the coefficients, it appears that the policy impacted positively the health of children with low-educated mothers (they are in better health), which would support the hygiene hypothesis discussed above. However, for children of high-educated mothers, the effects on health are less clear : on the one hand the probability of being in excellent health slightly declines, but on the other hand the probability of suffering asthma attacks also declines (Table 5). On behavioral development, we do not find evidence of the reform having any permanent effects on children of low-educated mothers. For children of high-educated mothers, the negative effects on emotional disorder and anxiety persist, but generally decline by about half compared to the preschool period. When we let policy effects vary by wave, we observe that for all behavioral outcomes the coefficients suggest a negative effect, especially in the last two cycles. These are the children who have been the most intensely treated by the reform. With a few exceptions, these effects are, however, generally not significant.

Finally, for children aged 7–9 years old, the reform generally has no significant persistent effects on children – of either low or high-educated mothers (Table 5). Simply looking at the signs of the coefficients, we continue to find evidence of positive effects on the health of children of low-educated mothers. For the behavioral measures, we observe that children of highly educated mothers remain more prone to emotional disorder because of the reform. The magnitude of the effects on the behavior of 7–9-year-olds is similar to those for the 5–6-year-olds (in school) (Table 5). For children of low-educated mothers the estimates on behavioral outcomes are less definitive, ranging from positive to negative with no clear patterns. To summarize, it appears that the long term negative effects we uncover are mainly driven by children of highly educated mothers.

Discussion The Quebec universal childcare reform appears to have had a negative effect on the well-being of children aged 0–5 years old who are not yet in school. The early effects documented by BGM persist up until 2007 but eventually fade away. According to Haeck et al. (2015), the adverse effects of the reform may be attributed in part to the structure of the program that offers at best a fair quality and strongly encourages families to use long hours of care.[10] Two main studies show that in the early years of the reform the average quality of care in Quebec's subsidized childcare network was at best satisfactory and in many cases was low or not acceptable (ISQ, 2004; Japel et al., 2005). This may be partially explained by the rush to implement the program, build up new settings, and create new rules and new spaces to meet parents' excess demand. Such a large deployment forced the government to accept into the network educators with no specific training in early childhood education (Haeck et al., 2015). We also show that the negative effects of the reform become smaller over time and eventually become insignificant by 2008–2009. This could be explained by the efforts of the Quebec government to improve the quality of the staff and the educational program.[11] But even today it remains difficult to determine whether the regulatory educational staff requirements measures are actually implemented[12] , and recent re-

10. Low-fee childcare is available from 10 to 12 hours a day (depending on the type of care : center- or family-based), 260 days per year, at a single fee of $7 for all children. The Quebec government requires that parents use these services every day of the week (unless the child is ill or on vacation with his parents). Indeed, if a space isn't occupied full time, the subsidy may be reduced. Although childcare can offer part-time spaces, in almost most cases they offer full-time places because they are easier to manage (Haeck et al., 2015).

11. In 2000, the Quebec government required that at least two in three staff members be qualified for early childhood care in center-based care (against one in three before). Educators' salaries also increased from 35% to 40% over a period of 4 years. In August 2006, the qualification staff requirements were extended to all center-based care, whether subsidized or not. The date of entry of this last requirement was set for August 31, 2011 for childcare services licensed before August 30, 2006. For centers that have been granted a license after this date, requirements must be met 5 years after the issuance of their license.

12. It's estimated that the percentage of subsidized childcare respecting the educator-child ratio was at most 42% in 2008 to 2009 and 54% in 2009 to 2010 (Vérificateur Général du Québec (VGQ), 2011). Moreover, over the past 5 years, 29% of licenses were

ports on the quality of childcare do not seem positive. Indeed, according to a report of the Auditor General of Quebec (2011), three-quarters of the projects selected for the development of childcare spaces in 2008 did not meet the quality criteria of the Ministry of Family (VGQ, 2011). Furthermore, a large percentage of children in Quebec are in family-based childcare. Family-based caregivers are not required to have a college or university degree in early childhood education. In 2010, 36% of children in childcare were in subsidized center-based care, 24% in unsubsidized center-based care and 40% in family-based care (MFA Québec, 2012). In sum, Quebec's subsidized childcare has no favorable effects on preschool children's development and well-being, unlike those observed in high-quality programs such as the Perry Preschool Program or the childcare programs of Scandinavian countries.

Regarding children 5–6 years old in school and 7–9 years old that were eligible for subsidized childcare when they were younger, we show that the reform has no lasting effects except negative, increasing emotional disorder. Our results are similar to other studies that have investigated the effects of subsidized childcare or, more generally, childcare and maternal employment, on child well-being. Indeed, we report an increased risk of infections in the preschool years, but these effects are insignificant on children's health in the elementary school years (Raynault et al., 2011). The idea that childcare acts as a protective factor during the elementary school years is not supported by our results. Several reasons may explain this. First, the NLSCY data is not optimally suited to study the problem of immunity because questions on nose/throat and ear infections are only asked for the 0–3-year-olds. However, the vast majority of studies dealing with this issue relate to such infections. Nevertheless, the adverse effects on the overall health of children disappears, and we report few – although rare – beneficial effects of the reform on injuries and asthma attacks. Second, we estimate intention to treat

renewed by the Ministry of Quebec without the specified inspection of the ministerial directive (VGQ, 2011).

effects (ITT). However, the effects may depend on the type of childcare used. Côté et al. (2010) find that children attending large daycare settings ($\geq$6 unrelated children) at an early age (before age 2.5 years old) may acquire immunity, but no differences were observed for children in smaller daycare surroundings. The failure to analyze the effects by the type of care may explain our findings.

Another interesting finding of our study is that the effects of the policy on behavioral outcomes are generally small and not significant (results indexed by †) but when they are significant it is for children who were fully eligible for the program (5 years of eligibility). More specifically, we show that only the impact on emotional disorders remains significant over the years, but the magnitude of the effect decreases by about 50% once in school. These effects are small and may only be transitional since we no longer observe significant negative effects on preschool children as of 2008. Overall, our results are consistent with those of Datta Gupta and Simonsen (2010), in Denmark, who find that being in a universal public program at the age of 3 has no impact on behavioral outcomes at 7 years old.[13] They are also consistent with Herbst and Tekin (forthcoming), in the United States. These authors find that children receiving childcare subsidies have lower cognitive ability scores and more behavioral problems early on but these effects largely vanish by grade 3 when children are about 8 years old.

Finally, we find that children of highly educated mothers tend to be the most adversely affected by the reform. Our estimates are consistent with Haeck et al. (2015) since the reform early on mainly affected the labor supply of mothers with a high level of education.[14] Low-educated mothers reacted later to the reform. Their labor force

13. The authors use the Strength and Difficulties Questionnaire (SDQ) as behavioral outcome. The SDQ index is based on emotional symptoms, and on conduct-, hyperactivity/inattention-, and peer-relationship problems.

14. Before the reform, low-income families were eligible for childcare subsidies, making the net cost of childcare similar to that for postreform. In contrast, mothers with higher levels of education (and thus possibly higher incomes) weren't eligible for these subsidies before the reform.

did not increase significantly before 2004. For their children, we observe a worsening of behavioral scores as of 2004, especially for the 2–3-year-olds. Our results are also in line with Loeb et al. (2007). These authors showed that nonparental care had adverse effects on children from affluent backgrounds, in particular for behavioral outcomes.

In sum the impact of the reform is essentially contemporary or direct — that is, when children are in preschool. Our results on the childcare could be affected by the implementation of full-day kindergarten and before- and after-school daycare implemented in Quebec in 1998. However, Haeck et al. (2015) showed that these two reforms were not enough to trigger an increase in the labor supply of mothers with school-age children. We also do not observe any significant changes in the health and behavioral development of school-age children mainly treated by these reforms (wave 4 children aged 5–6 years old).

6 Conclusion

In this paper, we estimated the long-term effects of the Quebec childcare reform, both in terms of the age of the child and the time since the program was first implemented. More specifically, we study the long-term effects of the low-fee childcare reform on child health, motor and social development, and behavior, shown in the seminal paper by BGM to be rather detrimental to prekindergarten children in Quebec. We follow treated children for more than 9 years and investigate the impact well beyond the first few years of the policy. A nonexperimental evaluation framework based on multiple pre- and posttreatment periods is used to estimate the policy effects.

We showed that the reform had negative effects on preschool children's health, motor-social development and behavior up to 2006–2007. However, our estimates by wave suggest that the effects became smaller over time and eventually turned insigni-

ficant by 2008–2009. This is encouraging as it suggests that children may no longer be experiencing detrimental effects on average.

We also found that for children aged 5–9 years old who were eligible for low-fee childcare since birth most of the earlier negative effects of the reform disappeared. One exception was the impact on emotional disorder that persisted over the child's life, but we showed that these effects were small. These results suggest that the negative effects on preschool children do not carry over to the school years. Finally, our analysis by maternal education suggests that the results are mainly driven by children of highly educated mothers.

The impact of the reform is essentially contemporary : it exists only while children are eligible for low-fee childcare and then disappears when they enter school. In this sense, the very negative trends of the reform drawn up by previous studies are not supported over the long run. While the effects do not persist, they also do not become positive (or even positive but not significant). Clearly, the network has to improve to generate the benefits that early childcare has delivered in other countries.

A more complete picture of the reform must also be achieved studying long-term effects of subsidized childcare on parental well-being. Increasing the participation of mothers in the labor market and decreasing the time mothers spend with the child could reduce maternal well-being and therefore have an impact on the child (see Brodeur et al., 2012 ; Lebihan et al., 2015).

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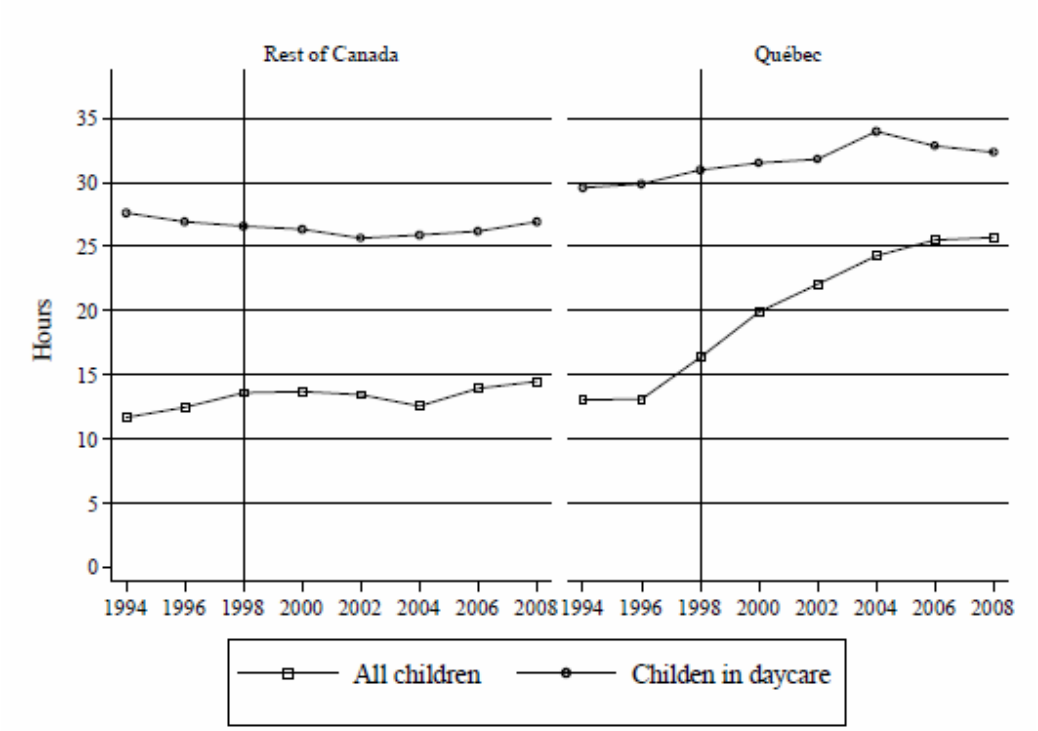
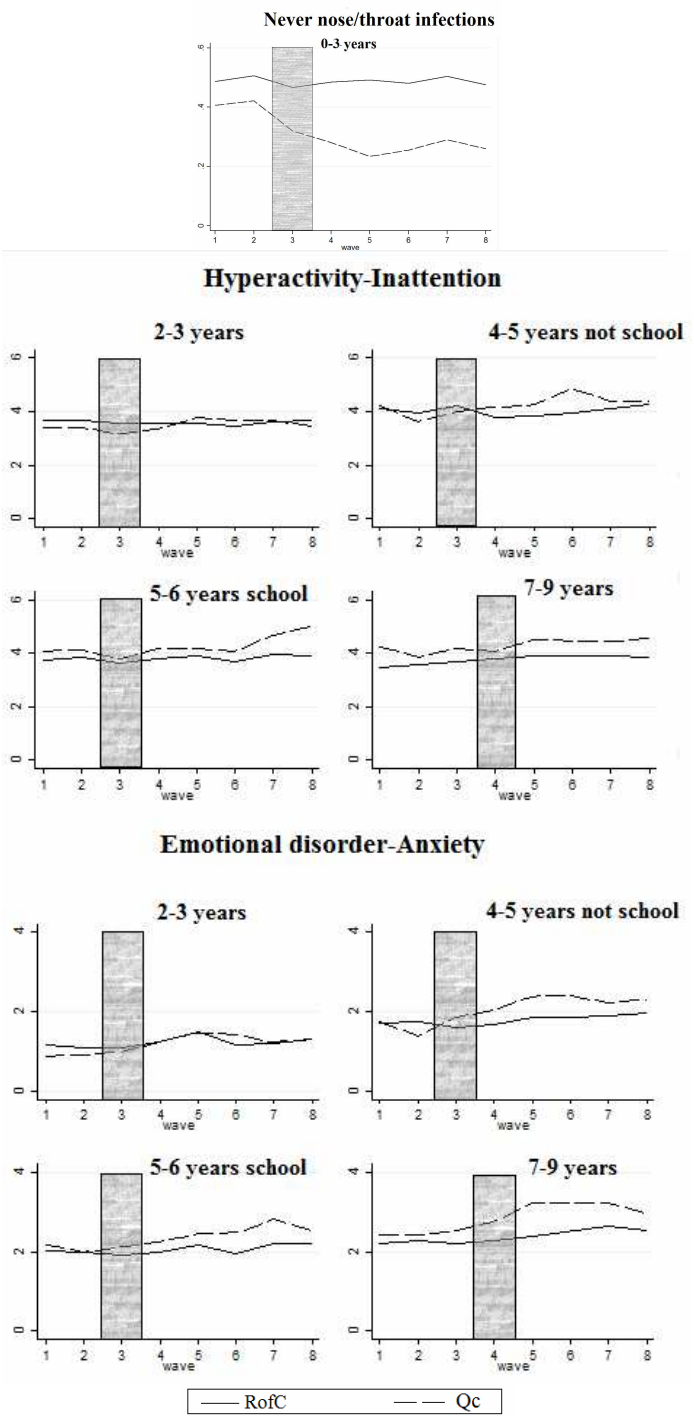
Figure 1 – Mean hours per week spent in the primary care arrangement for children aged 1 to 4.



Note: Shows the evolution of the mean number of hours per week spent in the primary mode of care in the Rest of Canada (left panel) and Québec (right panel) non conditionally (hollow square) and conditionally on attending childcare (hollow circle). The sample includes NLSCY cross-sectional children aged 1 to 4. Source: Haeck, Lefebvre and Merrigan (2015).

Figure 2 – Mean values of measures for child outcomes by region and age: waves 1-8 of the NLSCY



Note: Shows the trajectories for the mean of three outcomes by age of the child for Quebec and the Rest of Canada (RofC). The dashed-area shows the phase-in of the program.

Table 1 – Eligibility for low-fee child care by age of the child and NLSCY wave.

		Wave							
	Age	Wave 1 (1994-95)	Wave 2 (1996-97)	Wave 3 (1998-99)	Wave 4 (2000-01)	Wave 5 (2002-03)	Wave 6 (2004-05)	Wave 7 (2006-07)	Wave 8 (2008-09)
		Wave 1-5: Baker, Gruber and Milligan (2008)					Additional Data		
0-4 years: Baker, Gruber and Milligan (2008)	0	×	×	×	0.5	0.5	0.5	0.5	0.5
	1	×	×	×	0.5	1	1	1	1
	2	×	×	×	0.5	2	2	2	2
	3	×	×	0.5	1	2	3	3	3
	4	×	×	0.5	1	2	4	4	4
Additional Data	5	×	×	1	2	3	4	5	5
	6	×	×	×	1	2 (n.a)	3 (n.a)	5	5
	7	×	×	×	1	2 (n.a)	3 (n.a)	4	5
	8	×	×	×	×	1	2 (n.a)	3	5 (n.a)
	9	×	×	×	×	1	2 (n.a)	3	4 (n.a)

Notes : This table shows the eligible children in Quebec to the low-fee daycare reform (grey shaded area) and non-eligible children in Quebec (indicated by a symbol ×) according to child's age and wave. Numbers indicate the number of years of eligibility. For example, a 5-year child in wave 5 (and therefore born in 1997) was eligible for three years of low-fee child care. The index 0.5 refers to the fact that the child is eligible for a few months, not a year. We exclude wave 3 for children 0-6 years old and wave 4 for children 7-9 years old. The term n.a (not available) means that the child is eligible for low-fee child care spaces but data for this age group in this wave are not available in the NLSCY. Baker, Gruber and Milligan (2008) captured the short-term effects of the reform up to 2003. We extend the observation period to 2009.

Table 2 – Estimated Effects of the Policy on Children 0-5 Years Old Not in School

	Children 0 to 5 not in school						
Variable	β_{4-8} (2000-09)	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	N
Child Health							
Child in excellent health	-0.038** (0.018)†	-0.036 (0.024)	-0.049* (0.026)†	-0.060** (0.029)†	-0.013 (0.025)	-0.037 (0.025)	50,066
Child has been injured	0.013 (0.010)	0.012 (0.014)	0.004 (0.014)	0.018 (0.014)	-0.001 (0.013)	0.028 (0.017)	50,068
Child had asthma attack	0.004 (0.008)	0.005 (0.010)	-0.059 (0.069)	-0.016 (0.010)	0.033 (0.084)	0.024** (0.011)	37,499
Never had a Nose/ Throat Infection	-0.141*** (0.021)†††	-0.115*** (0.025)†††	-0.189*** (0.029)†††	-0.147*** (0.029)†††	-0.138*** (0.028)†††	-0.125*** (0.031)†††	40,450
Never had an Ear Infection	-0.063*** (0.020)†††	-0.040* (0.024)	-0.089*** (0.031)††	-0.090*** (0.029)†††	-0.042 (0.028)	-0.060** (0.029)	40,429
Child Development							
MSD Score	-0.092** (0.047)†	-0.176*** (0.054)†††	-0.065 (0.069)	-0.173** (0.069)††	-0.139** (0.067)†	0.055 (0.058)	38,569
Behavioral scores for 2-3 year-olds							
Hyperactivity-Inattention	0.089 (0.066)	0.022 (0.074)	0.171* (0.090)†	0.159 (0.100)	0.094 (0.098)	0.029 (0.090)	20,430
Emotional disorder-Anxiety	0.132** (0.060)†	0.084 (0.070)	0.095 (0.089)	0.270*** (0.086)†††	0.107 (0.088)	0.113 (0.111)	20,506
Physical Agression	0.216*** (0.068)†††	0.157** (0.077)	0.187* (0.095)	0.287*** (0.099)†††	0.277*** (0.098)††	0.185* (0.102)	20,346
Separation-Anxiety	0.032 (0.062)	0.026 (0.080)	0.012 (0.089)	0.112 (0.095)	-0.010 (0.082)	0.024 (0.084)	20,530
Behavioral scores of 4 and 5 year olds not in school							
Hyperactivity-Inattention	0.245** (0.098)††	0.240* (0.138)	0.290** (0.121)†	0.370** (0.145)††	0.201 (0.139)	0.120 (0.155)	9,528
Emotional disorder-Anxiety	0.378*** (0.080)†††	0.362*** (0.119)†††	0.454*** (0.106)†††	0.432*** (0.129)†††	0.386*** (0.122)††	0.251** (0.123)	9,546
Physical Agression	0.170** (0.082)†	0.234* (0.129)	0.221** (0.104)†	0.240* (0.137)	0.182 (0.124)	-0.045 (0.128)	9,536
Indirect Agression	0.123 (0.085)	0.225* (0.133)	0.214* (0.113)	0.022 (0.121)	0.054 (0.144)	0.058 (0.107)	9,334

Notes: This table displays the estimated policy effects and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the two-step procedure by Simes (1986) (adjusted estimates), we report only the level of significance (indexed by †). The table also shows the average effect for the full post-treatment period (β_{4-8}) and the effects by wave (β_4 to β_8). Estimates are for children aged 0-5 not in school and in two-parent families. Each regression includes all the control variables enumerated in the paper. Bootstrap weights from Statistics Canada are used for inference.
†††, ***: significant at 1% ; ††, **: significant at 5% ;†, *: significant at 10% ;

Table 3 – Estimated Effects of the Policy on Children 5-9 Years Old in School

	Children 5 to 6 in school							Children 7 to 9				
Variable	β_{4-8} (2000-09)	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	N	β_{5-8} (2002-09)	β_5 (2002-03)	β_7 (2006-07)	β_8 (2008-09)	N
Child Health												
Child in	-0.013	-0.001	-0.025	-0.004	-0.024	-0.019	15,618	-0.047	-0.054	-0.038	-0.064	14,780
excellent health	(0.036)	(0.044)	(0.043)	(0.066)	(0.051)	(0.051)		(0.032)	(0.049)	(0.035)	(0.061)	
Child has	-0.048*	-0.050*	-0.008	-0.078**	-0.052	-0.048	15,620	-0.012	-0.003	-0.013	-0.036	14,780
been injured	(0.027)	(0.030)	(0.034)	(0.036)	(0.034)	(0.033)		0.018	(0.026)	(0.020)	(0.029)	
Child had	0.003	0.003	-0.021	0.037	-0.099	0.002	11,699	-0.022	-0.140	0.040	0.000	9,254
asthma attack	(0.019)	(0.022)	(0.097)	(0.032)	(0.110)	(0.018)		(0.032)	(0.097)	(0.068)	(0.026)	
Child Behavior												
Hyperactivity-	0.101	0.018	-0.005	-0.017	0.090	0.334***	15,516	0.035	0.056	0.009	0.072	14,669
Inattention	(0.078)	(0.085)	(0.098)	(0.136)	(0.122)	$(0.116)^{\dagger\dagger}$		(0.060)	(0.091)	(0.066)	(0.113)	
Emotional disorder-	0.173**	0.103	0.138	0.175	0.235**	0.226**	15,536	0.224***	0.272***	0.203***	0.167	14,682
Anxiety	$(0.070)^{\dagger}$	(0.081)	(0.096)	(0.137)	(0.104)	(0.113)		$(0.063)^{\dagger\dagger\dagger}$	(0.090)	$(0.073)^{\dagger\dagger}$	(0.145)	
Physical Agression	0.105	0.141	-0.006	-0.008	0.171	0.100	15,527	0.073	0.030	0.112	0.048	14,656
	(0.070)	(0.087)	(0.087)	(0.133)	(0.107)	(0.106)		(0.068)	(0.097)	(0.078)	(0.111)	
Indirect Agression	0.114	0.027	-0.071	0.020	0.213	0.280*	15,016	0.080	0.045	0.138	-0.029	13,944
	(0.138)	(0.155)	(0.141)	(0.167)	(0.174)	(0.167)		(0.085)	(0.115)	(0.093)	(0.115)	

Notes: This table displays the estimated policy effects and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the two-step procedure by Simes (1986) (adjusted estimates), we report only the level of significance (indexed by †). The table also shows the average effect for the the post-treatment period (β_{4-8}) and the effects by wave (β_4 to β_8). Estimates are for children 5-6 in school and 7-9 and in two-parent families. Each regression includes all the control variables enumerated in the paper. Bootstrap weights from Statistic Canada are used for inference.
†††, ***: significant at 1% ; ††, **: significant at 5% ;†, *: significant at 10% ;

Table 4 – Estimated Effects of the Policy on Children 0-5 Years Old Not School by Maternal Education

Variable	Maternal Education: High school or less							Maternal education: Some postsecondary or more						
	β_{4-8} (2000-09)	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	N	β_{4-8} (2000-09)	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	N
Child Health														
Child in	-0.058	-0.113**	-0.052	-0.009	-0.010	-0.088	13,536	-0.031	-0.008	-0.048	-0.078**	-0.007	-0.023	36,530
excellent health	(0.038)	(0.049)	(0.053)	(0.056)	(0.057)	(0.061)		(0.022)	(0.028)	(0.031)	(0.031)††	(0.029)	(0.032)	
Child has	-0.008	-0.006	-0.016	-0.013	-0.039*	0.033	13,536	0.018	0.019	0.009	0.028	0.007	0.025	36,532
been injured	(0.019)	(0.025)	(0.024)	(0.029)	(0.020)	(0.040)		(0.011)	(0.016)	(0.015)	(0.018)	(0.015)	(0.017)	
Child had	-0.010	-0.005	-0.052	-0.030	0.072	0.011	10,300	0.008	0.008	-0.061	-0.012	0.015	0.028**	27,199
asthma attack	(0.015)	(0.021)	(0.116)	(0.019)	(0.224)	(0.022)		(0.011)	(0.012)	(0.095)	(0.012)	(0.100)	(0.014)	
Never had a Nose/	-0.108***	-0.082*	-0.117**	-0.153**	-0.048	-0.138**	10,901	-0.150***	-0.128***	-0.208***	-0.144***	-0.155***	-0.125***	29,549
Throat Infections	(0.034)††	(0.046)	(0.050)	(0.058)†	(0.059)	(0.054)		(0.024)†††	(0.030)†††	(0.033)†††	(0.032)†††	(0.035)†††	(0.033)†††	
Never had an Ear	0.000	-0.004	0.009	-0.019	0.032	-0.010	10,893	-0.085***	-0.056**	-0.121***	-0.115***	-0.066**	-0.078**	29,536
Infection	(0.035)	(0.046)	(0.057)	(0.057)	(0.058)	(0.057)		(0.021)†††	(0.028)	(0.034)†††	(0.030)†††	(0.028)†	(0.032)†	
Child Development														
MSD Score	-0.072	-0.220**	-0.094	-0.121	-0.123	0.197	10,367	-0.106*	-0.170***	-0.060	-0.197**	-0.148**	0.012	28,202
	(0.090)	(0.104)	(0.141)	(0.129)	(0.130)	(0.139)		(0.054)†	(0.062)††	(0.087)	(0.079)††	(0.071)†	(0.066)	
Behavior of 2-3 years														
Hyperactivity-	-0.093	-0.250*	-0.103	-0.110	0.100	0.027	5,640	0.159**	0.125	0.274***	0.253**	0.143	0.060	14,790
Inattention	(0.132)	(0.149)	(0.178)	(0.181)	(0.257)	(0.200)		(0.077)†	(0.085)	(0.104)††	(0.122)†	(0.107)	(0.104)	
Emotional disorder-	0.182	0.123	-0.241*	0.286*	0.200	0.551	5,672	0.105	0.067	0.197*	0.253**	0.085	-0.006	14,834
Anxiety	(0.121)	(0.134)	(0.142)	(0.157)	(0.200)	(0.359)		(0.068)	(0.073)	(0.110)	(0.112)††	(0.101)	(0.108)	
Physical Agression	0.224*	0.146	0.004	0.441***	0.305	0.226	5,611	0.207**	0.150*	0.260**	0.187	0.273**	0.175	14,735
	(0.127)	(0.139)	(0.207)	(0.158)†	(0.266)	(0.187)		(0.082)††	(0.088)	(0.102)††	(0.121)	(0.107)††	(0.129)	
Separation- Anxiety	0.027	0.120	-0.147	0.006	0.109	0.052	5,666	0.029	-0.030	0.060	0.154	-0.023	0.015	14,864
	(0.134)	(0.151)	(0.155)	(0.208)	(0.206)	(0.180)		(0.070)	(0.084)	(0.106)	(0.108)	(0.095)	(0.096)	
Behavioral scores for 4 and 5 year olds not in school														
Hyperactivity-	0.226	0.309	0.254	0.406	-0.244	0.117	2,607	0.261**	0.218	0.296**	0.332**	0.334**	0.149	6,921
Inattention	(0.185)	(0.304)	(0.214)	(0.256)	(0.322)	(0.276)		(0.117)†	(0.150)	(0.142)†	(0.164)†	(0.157)†	(0.180)	
Emotional disorder-	0.466***	0.554**	0.667***	0.385	0.200	0.094	2,611	0.348***	0.292**	0.333***	0.463***	0.411***	0.271*	6,935
Anxiety	(0.145)††	(0.249)	(0.198)†††	(0.245)	(0.236)	(0.236)		(0.097)†††	(0.131)†	(0.119)††	(0.153)††	(0.142)††	(0.144)	
Physical Agression	0.113	0.406	0.278	-0.087	-0.287	-0.227	2,604	0.190**	0.171	0.148	0.372**	0.298**	0.004	6,932
	(0.154)	(0.250)	(0.209)	(0.226)	(0.274)	(0.259)		(0.089)†	(0.124)	(0.111)	(0.148)††	(0.139)†	(0.153)	
Indirect Agression	-0.202	-0.110	-0.023	-0.303	-0.758*	-0.049	2,543	0.281***	0.388**	0.340**	0.215	0.324**	0.135	6,791
	(0.167)	(0.241)	(0.209)	(0.192)	(0.395)	(0.241)		(0.099)††	(0.173)††	(0.138)††	(0.158)	(0.131)†	(0.115)	

Notes: This table displays the estimated policy effects and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the two-step procedure by Simes (1986) (adjusted estimates), we report only the level of significance (indexed by †). The table also shows the average effect for the full post-treatment period (β) and the effects by wave (β_4 to β_8). Estimates are for children aged 0-5 not in school by maternal education. Each regression includes all the control variables enumerated in the paper. Bootstrap weights from Statistic Canada are used for inference.
†††, ***: significant at 1% ; ††, **: significant at 5% ;†, *: significant at 10% ;

Table 5 – Estimated Effects of the Policy on Children 5-6 Years Old in School and 7-9 Years Old by Maternal Education

	5-6 years in school							7-9 years				
	Maternal Education: High school or less											
Variable	β_{4-8}	β_4	β_5	β_6	β_7	β_8	N	β_{5-8}	β_5	β_7	β_8	N
	(2000-09)	(2000-01)	(2002-03)	(2004-05)	(2006-07)	(2008-09)		(2002-09)	(2002-03)	(2006-07)	(2008-09)	
Child Health												
Child in	0.046	0.040	0.039	0.029	0.187*	-0.086	4,278	0.019	0.051	0.008	-0.100	4,514
excellent health	(0.065)	(0.074)	(0.073)	(0.125)	(0.102)	(0.108)		(0.056)	(0.078)	(0.066)	(0.135)	
Child has	0.016	0.021	0.090	0.034	-0.044	0.001	4,279	-0.027	-0.023	-0.018	-0.098**	4,514
been injured	(0.038)	(0.044)	(0.058)	(0.055)	(0.042)	(0.061)		(0.030)	(0.045)	(0.032)	(0.043)	
Child had	0.007	0.007	-0.141	0.027	0.386*	-0.038*	3,259	-0.050	-0.096	0.004	-0.043	2,938
asthma attack	(0.027)	(0.034)	(0.158)	(0.046)	(0.198)	(0.022)		(0.066)	(0.149)	(0.120)	(0.027)	
Child Behavioral Scores												
Hyperactivity-	0.039	0.078	-0.007	-0.287	0.069	0.220	4,242	-0.051	-0.026	-0.031	-0.290	4,465
Inattention	(0.133)	(0.155)	(0.149)	(0.229)	(0.293)	(0.274)		(0.106)	(0.139)	(0.134)	(0.263)	
Emotional disorder-	0.073	0.026	0.115	-0.030	-0.174	0.510	4,256	0.227**	0.308**	0.265**	-0.415*	4,479
Anxiety	(0.125)	(0.141)	(0.156)	(0.246)	(0.203)	(0.319)		(0.107)	(0.154)	(0.135)	(0.249)	
Physical Agression	0.036	0.096	-0.022	-0.228	-0.040	0.245	4,245	0.141	0.092	0.169	0.259	4,466
	(0.121)	(0.136)	(0.146)	(0.226)	(0.244)	(0.212)		(0.124)	(0.157)	(0.160)	(0.316)	
Indirect Agression	0.040	-0.032	-0.048	-0.056	0.191	0.194	4,115	0.228*	0.250	0.276*	-0.146	4,261
	(0.146)	(0.174)	(0.168)	(0.213)	(0.243)	(0.310)		(0.129)	(0.161)	(0.161)	(0.177)	
	Maternal Education: Some postsecondary or more											
Variable	β_{4-8}	β_4	β_5	β_6	β_7	β_8	N	β_{5-8}	β_5	β_7	β_8	N
	(2000-09)	(2000-01)	(2002-03)	(2004-05)	(2006-07)	(2008-09)		(2002-09)	(2002-03)	(2006-07)	(2008-09)	
Child Health												
Child in	-0.032	-0.007	-0.046	-0.020	-0.086	-0.009	11,340	-0.078*	-0.111*	-0.061	-0.068	10,266
excellent health	(0.048)	(0.058)	(0.054)	(0.073)	(0.064)	(0.063)		(0.040)	(0.064)	(0.042)	(0.069)	
Child has	-0.077**	-0.082**	-0.055	-0.134***	-0.064	-0.070*	11,341	-0.010	-0.002	-0.008	-0.027	10,266
been injured	(0.035)	(0.040)	(0.040)	(0.043)††	(0.043)	(0.040)		(0.024)	(0.032)	(0.026)	(0.036)	
Child had	0.006	0.004	0.017	0.047	-0.191*	0.018	8,440	0.003	-0.149	0.062	0.023	6,316
asthma attack	(0.025)	(0.028)	(0.108)	(0.046)	(0.112)	(0.025)		(0.038)	(0.135)	(0.081)	(0.031)	
Child Behavioral Scores												
Hyperactivity-	0.124	-0.022	-0.002	0.097	0.103	0.383***	11,274	0.075	0.073	0.039	0.192	10,204
Inattention	(0.101)	(0.115)	(0.128)	(0.154)	(0.133)	(0.135)††		(0.076)	(0.125)	(0.078)	(0.129)	
Emotional disorder-	0.212**	0.128	0.162	0.255	0.358***	0.177	11,280	0.228***	0.247**	0.193**	0.296*	10,203
Anxiety	(0.089)	(0.101)	(0.120)	(0.163)	(0.127)††	(0.119)		(0.078)††	(0.113)	(0.085)	(0.164)	
Physical Agression	0.138	0.164	0.005	0.096	0.252**	0.073	11,282	0.046	-0.027	0.099	0.030	10,190
	(0.090)	(0.111)	(0.118)	(0.166)	(0.127)	(0.123)		(0.085)	(0.125)	(0.092)	(0.123)	
Indirect Agression	0.139	0.052	-0.077	0.052	0.226	0.291	10,901	0.009	-0.083	0.070	0.002	9,683
	(0.185)	(0.199)	(0.185)	(0.223)	(0.224)	(0.208)		(0.106)	(0.146)	(0.112)	(0.142)	

Notes: This table displays the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the two-step procedure by Simes (1986) (adjusted estimates), we report only the level of significance (indexed by †). The table also shows the average effect for the full post-treatment period (β) and the effects by wave (β_4 to β_8). Estimates are for children 5-6 in school and 7-9 by maternal education. Each regression includes all the control variables enumerated in the paper. Bootstrap weights from Statistic Canada are used for inference.
†††, ***: significant at 1% ; ††, **: significant at 5% ;†, *: significant at 10% ;

TABLE A.1 – Child outcomes index component (Appendix)

Child outcome Index	Questions : How often would you say that child :
Hyperactivity-Innatention 2-3 years old	a) Can't sit still, is restless or hyperactive?
(Range : 0-12)	b) Is distractible, has trouble sticking to any activity ?
	c) Can't concentrate, can't pay attention for long ?
	d) Has difficulty awaiting turn in games or groups?
	e) cannot settle to anything for more than a few moments?
	f) is inattentive ?
Emotional Disorder-Anxiety 2-3 years	a) Seems to be unhappy, sad or depressed ?
(Range : 0-12)	b) Is not as happy as other children ?
	c) is too fearful or anxious?
	d) Is worried ?
	e) is nervous, highstrung or tense?
	f) has trouble enjoying him/herself?
Physical Agression and Opposition 2-3 years	a) is defiant
(Range : 0-16)	b) Gets into many fights ?
	c) Doesn't change behavior after punishment
	d) has temper tantrums or hot temper
	e) has difficulty awaiting turn in games or groups
	f) reacts with anger and fighting
	g) has angry moods
	h) Kicks, bites, hits other children ?
Separation anxiety 2-3 years	a) cries a lot
(Range : 0-10)	b) clings to adults or is too dependent
	c) Doesn't want to sleep alone
	d) constantly seeks help
	e) Upset upset when separated from parents
Hyperactivity-Innatention 4-9 years	a) Can't sit still, is restless or hyperactive?
(Range : 0-14)	b) Is distractible, has trouble sticking to any activity ?
	c) Can't concentrate, can't pay attention for long ?
	d) Is impulsive, acts without thinking ?
	e) Has difficulty awaiting turn in games or groups ?
	f) Cannot settle to anything for more than a few moments ?
	g) Is inattentive?
Emotional Disorder-Anxiety 4-9 years	a) Seems to be unhappy, sad or depressed ?
(Range : 0-14)	b) Is not as happy as other children ?
	c) is too fearful or anxious?
	d) Is worried ?
	e) Cries a lot ?
	f) Is nervous, highstrung or tense ?
	g) Has trouble enjoying him/herself?
Physical Agression 4-9 years	a) Gets into many fights?
(Range : 0-12)	b) When another child accidentally hurts him/her, assumes that the other child meant to do it, and then reacts with anger and fighting
	c) Physically attacks people?
	d) Threatens people ?
	e) Is cruel, bullies or is mean to others?
	f) Kicks, bites, hits other children ?
Indirect Agression 4-9 years	a) When mad at someone, tries to get others to dislike that person
(Range : 0-10)	b) When mad at someone, becomes friends with another as revenge ?
	c) When mad at someone, says bad things behind the other's back?
	d) When mad at someone, says to others : let's not be with him/her ?
	e) When mad at someone, tells the other one's secrets to a third person ?

TABLE A.2 – Summary Statistics of Children aged 0-9 Years Old (Appendix)

Variable	Child aged 0-9			
	Quebec		Rest of Canada	
	Pre-Policy	Post-Policy	Pre-Policy	Post-Policy
Child is a boy	0.51	0.51	0.51	0.51
Mother				
Less than high school	0.17	0.10	0.10	0.08
High school diploma	0.16	0.15	0.20	0.19
Some post-secondary	0.25	0.16	0.28	0.15
Post-secondary degree	0.42	0.59	0.42	0.59
Age 14-24 at birth	0.20	0.20	0.17	0.16
Age 25-29 at birth	0.41	0.38	0.37	0.32
Age 30-34 at birth	0.30	0.30	0.32	0.35
Age 35 or more at birth	0.09	0.12	0.14	0.18
Immigrant	0.08	0.11	0.19	0.21
Father				
Less than high school	0.19	0.14	0.14	0.10
High school diploma	0.17	0.18	0.19	0.21
Some post-secondary	0.22	0.16	0.24	0.13
Post-secondary degree	0.43	0.52	0.44	0.56
Age 14-24 at birth	0.08	0.09	0.07	0.07
Age 25-29 at birth	0.32	0.29	0.27	0.24
Age 30-34 at birth	0.39	0.36	0.38	0.37
Age 35 or more at birth	0.21	0.26	0.27	0.32
Immigrant	0.09	0.13	0.18	0.20
Family				
Rural Region	0.18	0.15	0.16	0.12
Region $<$ 30K	0.12	0.12	0.15	0.16
Region 30-99,999K	0.09	0.09	0.07	0.09
Region 100-499K.	0.08	0.06	0.22	0.19
Region $>$ 499K	0.53	0.58	0.40	0.44
None older sibling	0.46	0.46	0.40	0.43
One older sibling	0.37	0.38	0.37	0.39
At least two older siblings	0.17	0.16	0.22	0.19
None younger sibling	0.62	0.71	0.61	0.69
One younger sibling	0.30	0.25	0.31	0.26
At least two younger siblings	0.07	0.04	0.08	0.05
Same age siblings	0.03	0.02	0.02	0.03
N	5,060	9,745	21,896	52,340

Notes : This table dipslays the weighted (sample weights from Statistics Canada) summary statistics for children, mothers,fathers, and families. The statistics are presented by region : Quebec and the Rest of Canada, for the pre-reform and post-reform periods as described in Table 1. Wave 3 of the NLSCY is excluded for children 0-6 years old and wave 4 of the NLSCY is excluded for children 7-9 years old. All statistics appearing in the table are percentages.

Services de garde universels et effets de long terme sur le bien-être parental : Cas d'une expérience naturelle au Canada

Catherine Haeck, Laetitia Lebihan, Pierre Lefebvre and Philip Merrigan *

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Dans ce papier, nous étudions les effets à long terme d'une politique de services de garde universels au Québec sur le bien-être parental. À l'aide des données de l'Enquête Longitudinale Nationale sur les Enfants et les Jeunes et d'une méthodologie quasi-expérimentale de type différence-en-différence, les effets de long terme sont étudiés aussi bien au niveau de l'extension du réseau des services de gardes subventionnés que lorsque l'enfant grandit. Nous montrons que la politique a augmenté les scores de dépression des mères ayant des enfants d'âge préscolaire. Les parents ont également adopté des pratiques parentales moins appropriées pour le développement de l'enfant. So, they are more hostile and aversive toward their children and have less positive interaction and consistent parenting. Aucune évidence d'amélioration en termes de temps d'adaptation ou de qualité du système n'est décelée dans les résultats. Néanmoins, la majorité des effets négatifs de la réforme sur le bien-être parental disparaissent lorsque l'enfant est scolarisé.

Key words : universal child care, parental well-being, long-term effects, child care policy, natural experiment.

JEL Classification : I31, J18, J20

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*Université du Québec à Montréal. The study is based on Statistics Canada's National Longitudinal Survey of Children and Youth (NLSCY). The data are available at the Quebec Inter-university Center for Social Statistics (QICSS). All computations and interpretation of these data are our own. This research was funded by the Fonds québécois de la recherche sur la société et la culture, the CIRPÉE and the program FARE. Corresponding author : à compléter

1 Introduction

Au cours de ces dernières années, il y eu une forte augmentation de la participation des mères au marché du travail. Au Canada, le taux d'emploi des mères ayant des enfants de moins de 6 ans augmenta de 31% en 1976 à 71% en 2008 [1]. La demande croissante de services de garde et les couts élevés des services de garde supportés par les parents souleva l'attention des public policy makers envers les public or subsidized childcare programs. L'idée que les subventions de SG ne soient plus limitées aux familles à faible revenu mais deviennent universelles, comme c'est le cas dans la plupart dans les pays européens, émerge de plus en plus dans l'esprit des gouvernements Nord-américains. En effet, advocates of universal childcare system argue that it's important to invest in young children because early childhood is a critical period of human development and que les rendements obtenus sont plus élevés quand les interventions sont précoces (Cunha and Heckman, 2010 ; Baker, 2011).

Les études sur les SG universels se sont principalement concentrées sur les effets sur l'emploi maternel et le développement de l'enfant [2]. Or, as mentionned by Herbst and Takin (2012), a complete account of the child care subsidy requires an thorough understanding of the ways in which subsidies influence both parents and their children. When mothers reallocate their time from home to labor market accompagné d'un changement dans la nature du temps passé avec l'enfant, ceci peut affecter non seulement le bien-être des enfants mais également le bien-être des parents. En effet, il existe une large littérature montrant comment le bien-être maternel affecte en lui-même le bien-être et le développement de l'enfant (NICHD, 1999, 2003 ; Almond and Currie, 2010).

La première étude faisant exception et ayant traité des effets des SG universels sur le bien-être des parents est celle de Baker, Gruber and Milligan (2008) avec le cas de la province du Québec au Canada. En 1997, le gouvernement du Québec mit en place un système de Service de Garde à Contribution Réduite (SGCR). Les places de garde avaient un tarif unique par enfant fixé à 5 dollars par jour et étaient de type universelles. La réforme fut mise en place progressivement pour finalement inclure tous les enfants québécois de moins de cinq ans en septembre 2000. Cette politique a eu pour effet de

1. The statistics are derived by the authors from the Canadian Labour Force Survey.
2. Voir Baker (2011) pour une revue de la littérature

drainer une proportion importante d'enfants en services de garde informels et garde maternelle vers des services de garde réglementés, notamment en installation. En effet, 75 % des enfants âgés de 0-4 ans au Québec sont en services de garde réglementés en 2012 alors qu'ils n'étaient que 18 % à la fin de l'année 1997 (Haeck et al., 2012). Ces chiffres sont la conséquence directe de la réforme avec l'augmentation du nombre de places de services de garde réglementés au Québec passant de 78 864 en septembre 1997 à 258 366 en mars 2013 (Ministère de la Famille et des Ainés, 2013). Environ 85 % de ces places de services de garde réglementées sont à contribution réduite (5 dollars). Les fond publics alloués au programme ont augmenté de manière considérable, allant de 288 millions de dollars pour l'année fiscale 1996-1997 à 2,3 milliards pour l'année fiscale 2012-2013. As a result of the policy, women's labor participation increased by 14.5 percent in Quebec (Baker and al., 2008) [3]. Aucune politique d'une telle ampleur affectant les enfants d'âge préscolaire n'a eu lieu dans les autres provinces canadiennes entre 1998 et 2008 (Haeck et al., 2013).

Néanmoins, Baker, Gruber and Milligan (2008) montrent également que cette réforme a eu un effet négatif sur plusieurs indicateurs de développement et de bien-être des parents et des enfants de 0-4 ans. En particulier, la politique a eu un effet négatif sur la santé des parents et ces derniers semblent avoir adopté des pratiques parentales moins appropriées pour le développement de l'enfant. Dans une étude plus récente, Kottelenberg et Lehrer (2013) confirment ces résultats en incluant des années supplémentaires et des méthodes d'estimation alternatives.

Bien que Baker and al. (2008) et Kottelenberg and al. (2013) étudient l'effet de la politique sur le bien-être des parents, ces derniers insistent peu sur ces résultats et se concentrent d'avantage sur l'emploi maternel et le bien-être des enfants. Nous proposons une extension de l'étude de Baker, Gruber et Milligan (2008) (nommé BGM par la suite) de deux façons.

Premièrement, les effets sur les parents sont étudiés sur une plus longue période d'observation, soit jusqu'en 2009. En effet, les effets mesurés par BGM reposent sur la période 2000-03, années où le programme venait d'être mis en place et où les services de garde subventionnés commençaient à s'étendre. Étant donné que l'instauration du programme a dû générer certaines frictions,

3. Using Survey of Labour and Income Dynamics data (SLID), Lefebvre et Merrigan obtiennent des résultats similaires : augmentation de la participation des femmes au marché du travail de 13 percent and augmentation des heures annuelles travaillées de 22 percent (Lefebre et Merrigan, 2008).

une période d'adaptation devait être nécessaire, aussi bien pour les parents que pour les enfants et le gouvernement afin de s'intégrer pleinement dans la société. En effet, étant donné que la politique a eu un large effet positif sur l'offre de travail maternelle et l'utilisation des services de garde, ces changements ont du avoir un certain impact sur l'organisation des parents. Ainsi, a range of parenting behaviors and health may change, especially in the short-run, as subsidized women with little employment experience adjust to the dual demands of paid work and childrearing (Herbst and Takin, 2013). Or, le réseau s'est considérablement élargi depuis 2000-2003, des efforts ont été entrepris pour tenter d'améliorer la qualité dans les services de garde (SG) et le nombre de familles bénéficiaires a largement augmenté. Ainsi, nous vérifions si les effets mesurés par BGM résultent d'une période de transition vers un nouveau régime social ou s'ils persistent dans le temps. Afin de tenir compte de la mise en œuvre progressive de la politique, nous incluons des effets de traitement pouvant être différents chaque année après la réforme [4].

Deuxièmement, contrairement à BGM et Kottelenberg et Lehrer (2013) qui ciblent leur étude uniquement sur les enfants de 0-4 ans, nous étendons l'analyse aux enfants âgés entre 5 et 9 ans. Afin de tenir compte of a major parental leave reform in 2000 across Canada and in 2006 in Quebec only, we exclude mothers of children below age 1 from our analysis. Nous incluons également les enfants de 5 ans non scolarisés dans l'étude des effets de la politique sur la période pré-scolaire. Par la suite, nous regardons les effets de la réforme sur les parents lorsque l'enfant entre à l'école et lorsqu'il est âgé de 7-9 ans. Ce suivi au-delà de l'âge de 5 ans permet d'observer si les effets négatifs décelés pour les parents dans la période pré-scolaire persistent dans les années élémentaires de l'école ou au contraire s'amenuisent dans le temps. Ainsi, nous analysons l'effet de la réforme sur le bien-être parental selon trois catégories d'âge de l'enfant : 1-5 ans non école, 5-6 ans école et 7-9 ans.

Ces deux éléments permettent de considérer les effets de long terme de la réforme du Québec sous deux angles : effets de long terme au niveau de l'extension du réseau et effets de long terme sur la vie des bénéficiaires. À notre connaissance, il s'agit de la première étude traitant des effets à long

4. Kottelenberg et Lehrer (2013) étendent également l'étude de BGM en analysant l'impact de la réforme sur une plus longue période d'observation (1994-2007). Néanmoins, l'étude de Kottelenberg et al. (2013) se base sur un effet moyen de la politique. Or, cette méthode ne permet pas de déceler véritablement l'évolution des effets puisque l'on calcule un effet moyen et que les effets négatifs au début de la réforme ont pu être compensé par les effets nuls ou positifs observés plus tard.

terme de la réforme des Services de Garde à Contribution Réduite sur le bien-être parental de ces deux points de vue [5].

Nous utilisons les données de l'ELNEJ (Enquête Longitudinale Nationale sur les Enfants et les Jeunes) qui constituent un échantillon représentatif de la population canadienne. The estimation of the impacts of the policy rely on a non-experimental framework where the evolution of outcomes for Quebec parents are compared with those of comparable parents in the Rest of Canada.

Nous montrons que la politique a augmenté les scores de dépression des mères ayant des enfants d'âge préscolaire. Les parents ont également adopté des pratiques parentales moins appropriées pour le développement de l'enfant. So, they are more hostile and aversive toward their children and have less positive interaction and consistent parenting. Aucune évidence d'amélioration en termes de temps d'adaptation ou de qualité du système n'est décelée dans les résultats. Néanmoins, la majorité des effets négatifs de la réforme sur le bien-être parental disparaissent lorsque l'enfant est scolarisé.

The outline of the paper is as follows. Section 2 reviews evidence from prior research and discuss the mechanisms by which such child care subsidies can influence parental well-being. Section 3 describes Quebec family policy. Section 4 presents the data set. In section 5, we describe the empirical strategy. Econometric results on the impact of the program on parents' well-being and their interpretation are presented in section 6. Section 7 concludes.

2 Previous research and mechanisms on child care, maternal employment and parental well-being.

In this paper, we examine if Quebec's universal child care program has an impact on parental health and behaviour in the long term. Il existe peu de littérature sur l'effet des SG ou de l'emploi maternel, sur le bien-être parental. Les études sur les subventions de SG sont encore moins nombreuses car ces dernières se sont concentrées principalement sur leurs effets sur l'offre de travail maternelle ou le bien-être de l'enfant. Nous proposons ci-dessous une

5. Voir les études de Lefebvre, Merrigan and Verstraete (2009) and Haeck, Lebihan and Merrigan (2014) pour une analyse des effets de long terme de la politique familiale du Québec sur l'offre de travail des mères et le bien-être de l'enfant, respectivement.

revue des études ayant traité de l'effet de l'emploi maternel et des services de garde (en particulier des SG subventionnés) sur le bien-être parental avant de voir les méchanismes potentiels par lequel les subventions de SG pourraient affecter le bien-être parental.

Baker, Gruber and Milligan (2008) analyse the impact of child care reform in Quebec on the use of child care, maternal employment and several outcomes of children and parents' development and well-being. They use the first two waves (1994-95 and 1996-97) and the last two waves (2000-01 and 2002-03) of the NLSCY data, available at the time. Leur étude cible les enfants de 0-4 ans. They show, among other things, that the reform increase mothers' depression scores and decrease satisfaction with the relationship. Moreover, the policy decreases the likelikood that fathers report being in excellent health, but hasn't statistically significant impact on mother's self-reported heath status. They also find that the Quebec family policy increases hostile and aversive parenting and decreases parental consistency.

Kottelenberg and Lehrer (2013) extend Baker and al. (2008) study by adding additional years (2004-05 and 2006-07). Using the same method as BGM (difference-in-difference), they confirm the negative effects of the family policy on Quebec's child and parental outcomes. À l'aide de méthodes d'estimation alternatives, ils montrent également that most of the negative impacts are driven by families who only attended child care as a result of the policy.

Brodeur and Connolly (2013), too, examine the effects of change on child care subsidies in Quebec on parental subjective well-being. Using data from the other data base (Canadian General Society Survey), the authors estimate a triple-difference model using differences pre- and post- reform between Quebec and the Rest of Canada and between parents with young children and those with older children. They find adverse effects of Quebec family policy on parents' life satisfaction. Interestingly, their analysis reveals large and positive effects for lower-educated parents and negative effects for higher-educated mothers and fathers.

In the same vein, Herbst and Takin (2013) estimate the impact of child care subsidy receipt on maternal health and the quality on child-parent interactions, using data from three nationnally representative surveys in the United States. Their study is based on a program named Child Care and Development Fund (CCDF) and theses subsidies are granted conditional on the parents being engaged in paid employment, job training and education. So, their analysis focus only on unmarried mothers because the program

aims atraising work levels among economically disavandtaged women with young children. The authors report that child care subsidies are associated with worse maternal health (overall health, anxiety depression and parenting stress) and poorer interactions between parents and their children (psychological and physical aggression toward their children).

Using data from German Socio-Economic Panel, Kröll and Borck (2013) examine how mothers' health and mother-child interaction are affected by whether they place their child in formal day care or not. Their estimation strategy consists to use local aggregate formal child care usage rates as an instrument for individual formal child care usage. They show that mothers are in a worse physical condition if their children attend formal care, but the effects are insignificant for mothers' mental health. Concerning mother-child interaction, they report that mothers placing their children in formal care interact with them more frequently.

En se concentrant sur les interactions mères-enfant, other studies show qu'un plus grand nombre d'heures passées en service de garde, lorsque les enfants sont âgés de 6 à 36 mois, est associé à une sensibilité maternelle moindre et à une relation moins positive de l'enfant avec sa mère. Concernant la taille de l'effet des heures de fréquentation des services de garde (0,15), celle-ci était similaire à celle de la dépression de la mère et d'un tempérament difficile chez l'enfant mais très inférieure à celle de l'éducation de la mère (0,70). En revanche, lorsque les enfants atteignent l'âge de quatre ans et demi et ce jusqu'en première année du primaire, la relation entre la durée de fréquentation et l'interaction mère-enfant dépend du sous-échantillon considéré (NICHD ECCRN, 2003). So, more non-maternal child care experience across the first 3 years was associated with less maternal sensitivity and less positive engagement of mother for White children but it was the inverse for non-White children through first grade. Negative associations between hours of care and sensitivity diminished over time for all children.

Chatterji, Markowitz and Brooks-Gun (2013) analyse the effects of early maternal employment on maternal health and well-being when children are 6 months old in the United States. They show that maternal work hours are positively associated with depressive symptoms and parenting stress and negatively associated with self-rated overall health. Interestingly, these effects don't seem to persist, as they almost disappear when considering the first 4.5 years of a child's life (Chatterji and al., 2011, 2013).

In sum, previous studies seem to suggest that child care subsidies and more generally, maternal employment and child care use worsens maternal

health and mother-child interaction. Nous proposons ci-dessous une discussion des potential mechanisms, proposed by the evidence, by which child care subsidies could affect parental well-being.

Herbst and Takin (2013) discuss how child care subsidies receipt affect parental well-being, grouping then into three categories. First, there is an effect on time allocation brought by increased work (Brodeur and al., 2013). Indeed, Quebec policy leads to a change in the maternal time allocation from non-market activities (including time spent with children and leisure) to formal labor. Subsidized mothers pourraient passer moins de temps dans des activités de loisir et de détente.

Second, change in child care subsidies may affect parental well-being throught increasing household income and enlarging consumption possibilities [6].

Third, child care subsidies may change the nature and quantity of maternal time spend with children (Baker and al., 2008). Indeed, Quebec policy a entrainé une augmentation des heures passées en SG pour l'enfant ainsi que du nombre de semaines travaillées pour la mère (Haeck and al., 2013). Le temps que la mère passe avec l'enfant s'en trouve par conséquent réduit et cela peut avoir des implications pour le bien-être de l'enfant et de la mère. Le fait de retourner sur le marché du travail ou de connaitre un emploi du temps plus chargé amène à plus de stress, surtout si l'on doit également concilier emploi et famille. Des niveaux de stress plus élevés worsen health outcomes and reduce the quality of child-parent interaction. Les habitudes et types d'activités entre l'enfant et le parent peuvent être modifiées, du moins à court terme, jusqu'à ce que la mère s'adapte physiquement et psychologiquement de travailler à nouveau, ou de manière plus intensive (Herbst and Takin, 2013).

6. Using Statistics Canada's annual 1997 to 2009 Survey on Households Spending, Haeck, Lefebvre and Merrigan (2014) document the increase in the maternal share of total household income in Quebec and use of instrumental variables approach to estimate the impact of the Quebec policy on intra-household expenditures. The authors reports "that more income in the hands of mothers impacts the expenditures structure within the household by raising budget shares on expenditures related to children, family goods and services having a collective aspect".

3 Quebec family policies

Nous proposons ci-dessous un bref apercu de la politique familiale au Québec [7].

In the late 1990's, government of Quebec proposed the gradual implementation of universal low-fee child care for the children less than 5 years. The low-fee child care have a single price per child $5 per day. In September 1997, only children aged 4 of September 30^{th} 1997 were eligible for low-fee child care. In September 1998, children aged 3 (on September 30^{th} 1998) were eligible for subsidized child care. In September 1999, children aged 2 (on September 30^{th} 1999) were eligible for low-fee child care. In September 2000, children aged less than 2 years were eligible for low-fee child care. Thus, by September 1^{st} 2000, all children under 71 months become eligible for subsidized child care, except children who were 5 years old (60 months) to September 30^{th} and who enter kindergarten. In 2004, the price of low-fee child care was increased from $5 to $7 per day per child. Two main objectives were pursued : i) facilitate the reconciliation of parental and professional responsibilities and ii) enhance child development and equal opportunities (Executive Council Office, 1997). So, the government set up new measures to allow, gradually, the preschool-age children attending regulated child care. These measures are the developement of center-care as "Centre de la Petite Enfance (CPE)" (centers for young children) and home-based care with a regulated provider. These home-based care are supervised by the CPE. With these new rules, government of Quebec implemented new standards such as the necessity to have qualified employees, the conformity of children/educator ratio according to age and the introduction of an educational program in regulated child care (Giguère and Desrosiers, 2010). Significant public funds are allocated to low-fee Quebec's policy ($2.3 billion for fiscal year 2012-2013) [8] (Treasury Board of Canada, Budget 2012-2013).

Figure 1 shows the evolution of the number of regulated spaces [9] from 1994 to 2013 and the number of subsidized spaces (low-fee) from 1998 to 2013 (31 March of each year) in Quebec. Subsidized spaces are those that

7. Plus plus de précisions, please refer to Baker and al. (2008), Lefebvre and Merrigan (2008) and Haeck and al. (2013) studies

8. Whether 4.67 % of Quebec's budget is devoted to education from early childhood. This is the highest rate in Canada.

9. Regulated spaces can take many forms : not-for-profit daycare centers (CPE), for-profit daycare center and family-based day care (Haeck et al., 2013)

apply a single rate of $ 5 per child per day (CPE and family-based day care regulated supervised by CPE). The total number of regulated spaces more than tripled between 1997 (year just before the reform) and 2013 from 78,864 to 258,366 regulated spaces. In 1997, none of the existing regulated spaces is low-fee (unsubsidized). Approximately 85% of regulated spaces are low-fee in 2013. Increased regulated spaces mainly concerned CPE and family-based day care supervised by CPE. Indeed, the number of spaces in CPE doubled from 1997 to 2013 and family-based day care have more than quadrupled [10]. This expansion was mainly started in 1999-2000 related the gradual implementation of the reform. Indeed, it wasn't until September 2000 that all children aged 0-4 years had access to low-fee spaces. At first, it is the parents who already had children 3-4 years in child care, and probably already on the labor market, which have benefited from these subsidized spaces. Then the parents of children 1-2 years, already in child care, anticipating a diminution in the price of child care in the coming months (Lefebvre and Merrigan, 2005).

Table 1 provides the number of regulated spaces by province for 1998, 2001 and 2008 [11]. It also shows the number of subsidized spaces, the amount of subsidies to child care, the daily fees, the net income eligibility threshold for a subsidy and the number of children aged 0-5 years in 2008. In ten years, Quebec is the province that has contributed to the largest increase in the number of regulated spaces (multiplied by 2.5 between 1998 and 2008). In 2008, 37% of regulated spaces in Canada were provided in the province of Quebec while it concentrates 23% of children aged 0-5 years in the country. The difference between Quebec and the Rest of Canada (RoC) is even more striking when one looks at the provincial subsidies for child care. The funds allocated by Quebec to low-fee spaces representing more than 55% of Canadian funds. While Quebec has a universal fee to $7 per day, the other provinces depends on child's age and parents' income. These figures show us that no policy of this magnitude affecting preschool children was enacted in the other Canadian provinces between 1998 and 2008.

This child care reform was combined with other family programs in Quebec : i) free full-day kindergarten for children aged 5 years to 30 September in 1997 replaced half-day kindergarten and ii) in September 1998, before-

10. For more details, see Haeck, Lefebvre and Merrigan (2013)

11. There is no reliable data to compare provinces on the number of regulated spaces before 1998.

and after-school daycare are offered to children at age 5 to 12, for the same cost as the low-fee child care (whether $5 per day per child and $7 in 2004). Néanmoins, the child care subsidies for children less than 5 years are by far the largest part of the family policy.

4 Données

L'Enquête Longitudinale Nationale des Enfants et des Jeunes (ELNEJ) est une enquête à long terme visant à mesurer un large éventail de caractéristiques liées au développement et au bien-être des enfants canadiens. Cette enquête biannuelle a débuté en 1994-95 (cycle 1) et s'est terminée en 2008-09 (cycle 8). The NLSCY contains both child and parent well-being scores and extensive questions relating to parental labour supply, child care usage and other demographic characteristics.

Notre objectif est d'étudier les effets à long terme de la réforme des Services de Garde à Contribution Réduite (SGCR) sur la santé et le comportement des parents. Étant donné la disponibilité des données et l'éligibilité aux SGCR selon l'âge de l'enfant, nous ciblons notre analyse sur les enfants de 1 à 9 ans. L'étude est réalisée pour trois catégories d'âge : 1-5 ans non scolarisés, 5-6 ans scolarisés et 7-9 ans.

Étant donné que la réforme des SGCR a été progressive, l'intensité de la politique a été différente selon l'âge de l'enfant et la période étudiée. Ainsi, il semble raisonnable d'effectuer les régressions selon l'expérience vécue des enfants. Les enfants de 1-5 ans non scolarisés captent l'effet présent d'être touché par la politique et peuvent servir de comparaison aux études déjà existantes sur la politique du Québec, et ce afin de voir si leurs résultats sont des effets de court terme ou au contraire des effets persistants. La possibilité d'un moment d'adaptation pour les bénéficiaires ainsi que l'évolution de la qualité des SGCR depuis sa mise en place peut donc être étudiée. Nous excluons les enfants de 0 ans qui peuvent être affectés par la réforme de congé parental instaurée au Québec en 2006 [12]. De plus, la majorité des parents ayant des enfants de moins d'un an bénéficient du congé parental fédéral [13]

12. In January 2006, Quebec establishes a new regime Quebec Parental Insurance Plan (Régime Québécois d'Assurance Parentale, RQAP). The RQAP has several advantages in terms of population covered, the rate of income replacement and flexibility in taking parental leave from the existing federal arrangement.

13. Au 31 décembre 2000, le gouvernement fédéral réforma le congé parental. Celui-ci

et peu d'enfants, en particulier au Québec, sont en service de garde à l'âge de 0 an. Nous incluons également les enfants de 5 ans non scolarisé dans l'étude sur les enfants préscolaires puisqu'ils sont susceptibles de continuer à être en SG subventionné le temps d'être éligible à la maternelle [14]. Étant donné que la majorité des enfants de 5 ans vont en maternelle au Canada, nous voulons également connaitre l'effet des SGCR à l'entrée de l'école (en y incluant aussi les enfants de 6 ans). Une fois passée l'étape cruciale de l'entrée à l'école, nous regardons les effets sur les parents ayant des enfants de 7-9 ans.

Le tableau 2 montre l'éligibilité des enfants à la réforme des SGCR selon leur âge et le cycle. Les enfants québécois éligibles à la politique des SCGR sont identifiés par un E et les enfants québécois non éligibles par une croix. Pour les enfants éligibles, le nombre d'années d'éligibilité maximale est également noté entre parenthèses [15]. L'indice E(0) désigne le fait que l'enfant est éligible pendant quelques mois et non une année entière. Le symbole ⊘ désigne le fait que bien que l'enfant soit éligible aux SGCR, les données pour cette catégorie d'âge à ce cycle ne sont pas disponibles dans l'ELNEJ. Nous considérons les enfants éligibles à la politique à partir du cycle 4 (partie grisée du tableau). As Baker and al. (2008), we exclude the third wave (1998-99) of the data from the analysis. Cette période constitue a phase-in of the program en raison du nombre de places subventionnées offertes et de l'âge d'admissibilité. Ce n'est qu'en 2000 (cycle 4) that all children under 71 months become eligible for subsidized child care. So, pour prévenir toute ambiguité, nous préférons exclure le cycle 3, comme BGM.

augmenta le nombre de semaines payées de congé parental de 25 semaines, passant ainsi de 10 à 35 semaines payées (Programme de Prestations Parentales (PPP)). Étant donné que les mères éligibles bénéficiaient déjà de 15 semaines payées de congé maternité, cette réforme étendit le nombre total de semaines payées de congé de 25 à 50 semaines. De plus, le nombre minimal d'heures pour assurer l'éligibilité passa de 700 à 600 heures. Le taux de remplacement du revenu resta identique, soit 55 % des salaires antérieurs. Par la suite, les lois provinciales se sont aussi ajustées et ont augmenté la durée des congés à au moins 50 semaines afin de protéger les mères actives sur le marché du travail. Cette réforme a eu un impact significatif sur le nombre d'heures en services de garde des enfants âgés de moins d'un an ainsi que sur la participation de leur mère au marché du travail durant leur première année (Haeck, Lefebvre et Merrigan, 2012).

14. Les résultats restent similaires si l'on considère les catégories d'âge suivantes : 0-4 ans, 1-4 ans et 0-5 ans no ecole. Les résultats sont disponibles sous demande.

15. Pour calculer le nombre d'années éligibles, nous utilisons la première année de la période de deux ans. Par exemple, pour le cycle 4 (2000-01), nous calculons selon l'âge au 31 décembre 2000. En effet, les enquêtes de l'ELNEJ sont menées à l'automne de la première année (automne 2000 par ex.) et l'hiver de la seconde année (hiver 2001 par ex.).

Dans la même optique que BGM, nous nous concentrons également sur les couples afin d'éviter les interférences avec d'autres politiques ciblant les familles à faible revenu (famille monoparentales et couples ayant une faible éducation). En effet, various provincial and federal reforms have emerged since 1997, can interact with the low-fee reform. Baker and al. (2005) and Milligan and Stabile (2007) show that changes in family/child benefits have had a significant impact on different outcomes of single-parent families, but extremely low for two-parent families. In addition, for Quebec in particular, the government of Quebec announced in January 2005 its intention to introduce a new policy of incentives to work. This work premium aims to support and develop work effort but also to encourage people to exit welfare to work (Quebec's Ministry of Finance of Quebec, 2004). This policy relates primarily single-parent families and two-parent families with low education. Therefore, since any specific shock in Quebec coinciding with the universal child care reform may bias our results, we focus as Baker and al. (2005, 2008) on two-parent families. Subsamples according to maternal education and family type are also made for étudier l'hétérogénéité des effets de la réforme. Nous utilisons les 1000 poids bootstrap développés par Statistique Canada dans le cas d'un échantillon d'enquête complexe tel que l'ELNEJ. Nous gardons uniquement les cas où la mère est le répondant principal c'est-à-dire la Personne qui Connait le Mieux l'enfant (PCM)[16].

Variables dépendantes Afin de mesurer l'effet de la politique des SGCR sur la santé des parents, nous utilisons les indices suivants, présents dans l'ELNEJ : (1) l'état de santé de la mère est excellent (1 : excellent, 0 : non excellent) ; (2) l'état de santé du père est excellent (1 : excellent, 0 : non excellent) et (3) l'état dépressif de la mère (score variant de 0 à 36). Un score élevé dénote la présence de symptomes de dépression. L'ensemble des questions de santé des parents est posée à ceux ayant des enfants de 1 à 9 ans.

Concernant le comportement des parents et des pratiques parentales[17], plusieurs indices sont rapportés : (1) le score de dysfonctionnement familial (score variant de 0 à 36) ; (2) interactions positives (score variant de 0 à 20) ;

16. Cela correspond à plus de 91 % des cas et ne modifie pas les résultats estimés. BGM le font également afin d'avoir le plus de variables de contrôle possibles.

17. Voir en Annexe pour une description des indices de comportement et de santé des parents

(3) inefficacité parentale (score variant de 0 à 25) ; (4) cohérence parentale (score variant de 0 à 20) et (5) style rationnel (aversion) des parents (score variant de 0 à 20). Un score élevé indique un comportement parental positif pour le bien-être de l'enfant (hormis pour le dysfonctionnement familial, le style inefficace et l'aversion des parents où c'est l'inverse). L'ensemble des questions sur le comportement des parents portent sur les enfants de 2-9 ans, hormis le dysfonctionnement familial qui porte sur les enfants de 1-9 ans.

Le tableau 3 présente les statistiques descriptives des variables dépendantes pour le Québec et le Reste du Canada avant et après la politique des SGCR (moyenne, écart-type, étendue, nombre d'observations) pour les couples selon différentes catégories d'âge de l'enfant (1-5 non école, 5-6 ans école et 7-9 ans). Nous remarquons qu'il n'y a pas de grandes différences dans les variables dépendantes avant la réforme des SGCR entre les régions du Canada. Cependant, après la politique des SGCR, nous remarquons une détérioration de plusieurs indices de santé et de comportement des parents (état dépressif de la mère, interaction positive et inefficacité parentale). Ces résultats négatifs concernent surtout les enfants de 1-5 ans non scolarisés. En ce qui a trait aux enfants de 5-6 ans école et 7-9 ans, les différences sont nettement moins présentes.

Variables de contrôle Nous utilisons les mêmes variables de contrôle que BGM afin de pouvoir établir un lien de comparaison avec leurs résultats. Le tableau 4 montre les statistiques descriptives des caractéristiques de l'enfant, de la mère et du père ainsi que de la famille, pour les enfants de 1 à 9 ans avant et après la réforme des SGCR au Québec et dans le Reste du Canada [18]. Les variables de contrôle sont : le sexe de l'enfant, le plus haut niveau d'éducation de la mère et du père (moins élevé que l'école secondaire, diplôme d'études secondaires, études post-secondaires, diplôme d'études universitaires (omis)), le groupe d'âge de la mère et du père à la naissance (14-24 ans (omis), 25-29 ans, 30-34 ans, 35 ans et plus), une variable dichotomique si la mère ou le père sont nés à l'étranger, la taille du secteur de résidence (cinq groupes de rural à 500 000 habitants et plus (omis)), la présence d'enfants plus âgés (aucun enfant plus âgé (omis), un seul enfant plus âgé, au moins deux enfants

18. Nous décidons d'inclure tous les enfants de 1 à 9 ans pour présenter les statistiques descriptives des variables de contrôle. En effet, ces statistiques ne sont pas différentes selon la catégorie d'âge pour les couples. Les périodes de pré et post-réforme sont basées sur le tableau 2.

plus âgés), la présence d'enfants plus jeunes (aucun enfant plus jeune (omis), un seul enfant plus jeune, au moins deux enfants plus jeunes), la présence d'enfants du même âge et des variables dichotomiques pour l'âge de l'enfant.

En termes de caractéristiques démographiques, il n'y a pas de différences importantes entre les groupes de traitement et de contrôle dans la période de pré-réforme. Néanmoins, nous notons que la part des mères et des pères ayant un niveau d'éducation less than high school est légèrement plus importante au Québec que dans le Reste du Canada (16 % et 19 % au Québec versus 10 % et 13 % dans le Reste du Canada, respectivement pour la mère et le père). De plus, la part des mères immigrées est plus importante dans le Reste du Canada qu'au Québec (8 % au Québec versus 19 % dans le Reste du Canada avant la réforme). Il en est de même pour les pères immigrés (9 % au Québec versus 19 % dans le Reste du Canada avant la réforme). Les pères âgés de 35 ans et plus à la naissance de l'enfant sont plus nombreux dans le Reste du Canada qu'au Québec (21 % au Québec versus 27 % dans le Reste du Canada dans la période de pré-réforme). Nous remarquons également une plus grande fraction d'enfants vivant dans les régions de 100 000 à 499 999 habitants dans le Reste du Canada qu'au Québec avant la réforme (8 % au Québec versus 22 % dans le Reste du Canada). La composition familiale est similaire entre les deux groupes. De même, les changements dans les caractéristiques au sein des groupes sont faibles et similaires. Pour les deux groupes, nous observons une augmentation de la part des mères et des pères ayant un diplôme d'études universitaires ainsi qu'une augmentation de l'âge des parents à la naissance de l'enfant. Les autres caractéristiques sont relativement stables dans le temps avec des amplitudes similaires entre les deux groupes. Ainsi, il semble approprié d'utiliser les autres provinces canadiennes comme groupe de contrôle dans les régressions.

5 Méthodologie

In order to estimate long-run effects of low-fee child care reform, we use a non-experimental evaluation framework based on multiple pre- and post-treatment periods. Pour ce faire, nous disposons de deux groupes (Québec et le Reste du Canada) qu'on observe avant et après la politique, mais seul le Québec est touché par la réforme. Le groupe de traitement inclut les parents du Québec avec un certain âge de l'enfant avant et après la réforme et le groupe de contrôle les parents du Reste du Canada ayant des enfants de

cette même catégorie d'age observés pour la même période de temps [19]. L'estimateur de Double-Différences consiste à comparer l'évolution des résultats des traités avant et après la politique à celle des résultats des non-traités sur la même période.

Nous utilisons les huit cycles de l'ELNEJ, à l'exception du cycle 3 (cf section 4 pour justification). Les périodes de pré-traitement et post-traitement diffèrent selon l'âge de l'enfant (tableau 2). Afin de tenir compte de la mise en œuvre progressive de la politique, nous incluons des effets de traitement pouvant être différents chaque cycle après la réforme (Francesconi et Van der Klaauw, 2007). Cette méthode est particulièrement adaptée pour l'instauration des réformes progressives dans le temps (Bettendorf et al., 2012 ; Bauernschuster et al., 2013). Dans notre cas, des coupes transversales répétées des parents sont observées dans le groupe de traitement et de contrôle, avant et après la réforme. L'estimateur de Double-Différence s'écrit :

$$Y_{ij} = \alpha + \theta Q_{ij} + \sum_{j=1}^{8} D_j + \sum_{j=c}^{8} \beta_j W_j Q_{ij} + \Phi X_{ij} + \varepsilon_{ij} \tag{1}$$

où Y_{ij} représente le résultat du parent de l'enfant i au cycle j . Les résultats étudiés ici sont la santé et le comportement des parents. La variable Q_{ij} prend la valeur 1 si l'enfant i habite au Québec au cycle j et 0 sinon. A set of eigh D_j wave dummy variables capture aggregate effects. To account for the progressive implementation of the policy selon la catégorie d'âge des enfants, a set of dummies W_j for each of the post-reform waves interacted with Q_{ij} is included. Les variables W_j prennent la valeur 1 si le cycle est supérieur ou égal à $c = 4$ pour les enfants de 1-6 ans, $c = 5$ pour les enfants de 7-8 ans et $c = 6$ pour les enfants âgés de 9 ans (cf tableau 2). X_{ij} est un vecteur de variables de contrôle socio-économiques pouvant également avoir un effet sur le résultat Y en dehors de la politique et auxquelles sont associées le vecteur de paramètres Φ. Le terme ε_{ij} désigne les termes d'erreur. Le coefficient α est un facteur commun à toutes les personnes, indépendamment de la politique et des autres facteurs influençant le résultat Y .

Un certain nombre de critiques sont faites sur la méthode des Doubles-Différences (Bertrand, Duflo et Mullainathan, 2004 ; Donald et Lang, 2007). En effet, l'existence de chocs communs c'est-à-dire le fait que les individus au sein des groupes subissent probablement des chocs communs posent problème pour l'inférence. L'ignorance de ce problème peut sous-estimer les

19. Les résultats sont similaires if we use Ontario's parents as the control group.

écarts-types des estimateurs et mener à des estimateurs non convergents. Il en résulte une sur-estimation des t-statistiques et des niveaux de significativité et donc à un sur-rejet de l'hypothèse nulle. Même s'il est peu vraisemblable qu'il existe des chocs transitoires non observés affectant uniquement le Québec et non le Reste du Canada (ou vice-versa) au niveau du comportement et de la santé des parents, nous décidons d'en tenir compte en corrigeant les écarts-types. Ceci permet d'augmenter les écarts-types afin de tenir compte de ces chocs transitoires et de limiter la non-convergence des estimateurs. Pour ce faire, nous utilisons une procédure en deux étapes pour corriger les écarts-types afin de tenir compte de la possibilité que des chocs transitoires non observés affectent un seul des deux groupes (Donald et Lang, 2007). Premièrement, nous régressons les variables de résultat sur les variables de contrôle X_{ij} et un ensemble de variables dummies représentant chacune une interaction province-cycle-âge de l'enfant [20], tout en considérant les poids transversaux associés. Deuxièmement, nous régressons les coefficients estimés des termes d'interaction province-cycle-âge sur une constante, time dummies, une variable dichotomique Québec et les termes d'interaction $\sum_{j=c}^{8} \beta_j W_j Q_{ij}$. Chaque observation est pondérée par l'inverse de la variance des termes d'interactions estimés dans la première étape. Nous suivons Haeck, Lefebvre et Merrigan (2012) et utilisons la distribution normale standardisée pour l'inférence, comme le propose Woolridge (2006) lorsque le nombre d'observations par groupe est élevé.

6 Résultats

Cette section présente les résultats obtenus selon le type de famille et l'âge de l'enfant. Dans un premier temps, notre attention se porte sur les familles à deux parents en segmentant l'âge des enfants en trois catégories : 1-5 ans non scolarisés, 5-6 ans scolarisés et 7-9 ans [21]. Dans un second temps,

20. Pour les enfants de 1-5 ans non école, nous obtenons 350 dummies possibles (10 provinces, 7 cycles, 5 ages différents). Pour les enfants de 5-6 ans école, nous avons 120 dummies possibles (10 provinces, 7 cycles, 2 ages différents). Pour les enfants de 7-9 ans, nous avons 180 dummies possibles (10 provinces, 7 cycles, 3 ages différents). Tenir compte de l'âge est primordial étant donné la longue période de mise en œuvre de la politique. Voir également table 2 pour de plus amples précisions sur l'absence d'informations pour certains cycles et certains ages de l'enfant.).

21. Afin de consolider nos résultats, des tests placebo ont été effectués pour l'ensemble des outcomes utilisés et des catégories d'âge. Par exemple, pour les 1-5 an non école et les

nous analysons la robustesse de nos résultats avec des échantillons alternatifs (pour les familles monoparentales et selon l'éducation des parents). Nous présentons les résultats non corrigés (indicés par $\star$) et corrigés à la Donald et Lang (2007) (indicés par †) par cycle ainsi que les effets moyens sur la période entière [22, 23].

6.1 Couples

Le tableau 5 montre les effets estimés de la politique des SGCR sur la santé et le comportement des parents ayant des enfants âgés de 1-5 ans qui ne sont pas scolarisés. Les résultats pour les parents ayant des enfants de 5-6 ans à l'école et 7-9 ans sont respectivement présentés dans les tableaux 6 et 7. Nous discutons d'abord des résultats pour les enfants de 1-5 ans non ecole et par la suite ceux des 5-6 ans école et 7-9 ans.

Enfants de 1-5 ans non école Les résultats non corrigés (indicés par $\star$) montrent que la réforme des SGCR augmente significativement le score dépressif de la mère (effet significatif de 0,70 soit une augmentation de 17.2 % du score dépressif maternel par rapport à la moyenne et représentant 15 % de l'écart type). Nous notons également une diminution des interactions positives (effet significatif de 0,62 soit une diminution de 4 % par rapport au score moyen de pré-réforme et 23 % de l'écart-type)) entre l'enfant et les parents ainsi qu'une augmentation de l'inefficacité parentale et de l'aversion des parents (effets significatifs de 0,69 et 0,34 respectivement). Lorsque l'on analyse les effets par cycle, nous remarquons que les effets significatifs sont présents sur l'ensemble des cycles. Ces effets sont de taille importante et re-

5-6 ans école, nous avons utilisé le cycle 1 comme pré-réforme et le cycle 2 post réforme. Pour les parents avec des enfants de 7-9 ans, plusieurs possibilités ont été testés pour les périodes de pré et post-réforme. Pour l'ensemble des régressions, les résultats étaient non significatifs et sont cohérents avec nos objectifs. Les résultats sont disponibles sur demande.

22. Pour les estimations non corrigées, nous reportons les coefficients et écart-types estimés ainsi que le niveau de significativité (indicés par $\star$). Par souci de clarté et d'espace, pour les estimations corrigées, nous reportons uniquement le niveau de significativité des résultats (indicés par †). Les coefficients estimés corrigés sont similaires à ceux des non corrigés et leurs écart-type sont environ deux fois supérieurs à ceux des non corrigés.

23. Les estimations obtenues par MCO et probit sont très similaires également. Néanmoins, afin d'appliquer la méthode de Donald et Lang (2007), nous devons nous restreindre aux estimations par MCO.

main so once we account for unobserved aggregate transitory shocks (indicés par †).

Enfants de 5-6 ans école Cette section présente les résultats pour les parents ayant des enfants âgés de 5 et 6 ans scolarisés (tableau 6). Il s'agit de la première étude traitant des effets de la réforme des SG du Québec sur ce groupe d'âge (ainsi que sur celui des 7-9 ans). La grande majorité des effets négatifs de la politique sur les parents, décelés dans la période préscolaire, disparaissent une fois que l'enfant entre à l'école. Le niveau d'intéraction positive entre l'enfant et le parent fait cependant exception. En effet, la politique continue d'avoir un effect négatif sur cet outcome avec ou sans correction des écart-types (effet significatif de 0.64). Nous observons une diminuation de 4.6 % par rapport au score moyen de pré-réforme, soit 25 % de l'écart-type, ce qui le rend très proche de sa valeur à 1-5 ans non école. Interestingly, nous remarquons que pour le score d'interaction positive, les effets sont plus importants aux cycle 5 et 6, ce qui correspond au cas où seuls les enfants de 5 ans scolarisés sont étudiés (cf tableau 2). Ceci tend à supposer que parmi cette catégorie d'âge, les enfants de 5 ans sont les plus touchés.

Enfants de 7-9 ans Concernant les enfants de 7-9 ans, the effects are globalement insignificant (table 7). These results are also robust to the two-step procedure accounting for unobserved transitory shocks.

6.2 Échantillons alternatifs

Dans cette section, nous explorons l'hétérogénéité des résultats avec différents sous-échantillons. Nous étudions si les effets estimés diffèrent selon l'éducation des parents (éducation faible et forte des familles à deux parents) ou le type de famille.

6.2.1 Éducation de la mère

Éducation faible de la mère

Les tableaux 8 et 9 présentent les résultats estimés pour les enfants ayant une mère avec un niveau d'éducation faible[24], pour les 1-5 ans non école

24. Possède un diplôme d'études secondaires ou moins

et les 5-9 ans scolarisés respectivement. Les résultats sont similaires à ceux obtenus pour tout type d'éducation (tableaux 5, 6 et 7).

Concernant les **enfants de 1-5 ans non scolarisés**, les résultats non corrigés (indicés par $\star$) montrent que la réforme des SGCR a un effet négatif sur plusieurs outcomes de bien-être des parents ayant une faible éducation. En effet, nous observons une augmentation du score dépressif de la mère (effet positif de 0,94) ainsi que plusieurs effets adverses sur le comportement des parents. En analysant les effets par cycle, nous remarquons que les effets de la politique sur les outcomes des parents s'étendent sur l'ensemble de la période post-réforme. Ces résultats sont robustes à la correction des écart-types par la méthode de Donald et Lang (coefficients indicés par †).

La majorité des effets décelés pour les enfants d'âge préscolaire disparaît à l'entrée de l'école (**enfants de 5-6 ans scolarisés**). Nous notons une exception pour le niveau d'interaction positive (effet significatif de 0.97). En effet, nous observons une diminution significative des interactions positives de 7 % par rapport à la moyenne (soit 34 % de l'écart-type). La taille des effets pour cet outcome est plus élevée que lorsque l'enfant a entre 1 et 5 ans (34 % versus 24 % de l'écart-type pour les enfants non scolarisés).

Concernant les **enfants de 7-9 ans**, les effets de la réforme sur les parents sont non significatifs et ce peu importe l'outcome étudié. These results are also robusts to la méthode de Donald et Lang.

Éducation forte de la mère

Les effets estimés pour les enfants ayant une mère avec un niveau d'éducation élevé [25] sont présentés dans les tableaux 10 (1-5 non école) et 11 (5-9 ans école), respectivement.

Concernant les **enfants de 1-5 ans non école**, la réforme des SGCR a un effet positif sur le score dépressif de la mère (effet positif de 0.60). Elle a également un effet positif sur l'inefficacité parentale et l'aversion des parents et un effet négatif sur les interactions positives entre les parents et l'enfant. À nouveau, les effets sont significatifs sur l'ensemble de la période post-réforme. L'ensemble des effets demeure une fois que l'on corrige pour les chocs transitoires non observés. De manière intéressante, nous remarquons que la taille des effets et la significativité des résultats sont moins importantes pour les parents ayant une éducation élevée que pour ceux avec une faible

25. A effectué des études postsecondaires ou détient un diplôme d'études universitaires.

éducation. Par exemple, pour le score dépressif de la mère, les effets sont de l'ordre de 13% de l'écart-type pour les mères avec une forte éducation versus 21 % sd pour les mères avec une faible éducation. Du point de vue de l'aversion, les effets sont de 20 % sd pour les mères ayant une faible éducation et 16 % sd pour celles ayant une éducation élevée.

Pour les **enfants de 5-6 ans**, seul un effet de la politique sur le niveau d'intéractions positives demeure. Ce dernier est de même ampleur que celui observé avant l'entrée de l'école (entre 21 et 22 % sd dans les deux cas). À nouveau, nous remarquons que la réforme a un effet plus important sur les mères ayant une éducation faible que forte. Ces résultats sont robustes à la correction des écart-types par la méthode de Donald et Lang.

Pour ce qui a trait des **enfants de 7-9 ans**, les effets de la réforme sur le bien-être parental sont non significatifs pour l'ensemble des outcomes étudiés. Lorsque we account for unobserved aggregate transitory shocks, on observe que les effets deviennent significatifs pour l'intéraction positive et le niveau d'aversion. Néanmoins, ces effets restent relativement rares et ne sont significatifs qu'à 10 %.

6.2.2 Famille monoparentale

Le tableau 12 montre les effets estimés pour les familles monoparentales ayant des enfants de 1 à 5 ans non scolarisés. Nous estimons également les effets de la réforme pour ceux ayant des enfants âgés de 5 à 9 ans à l'école (tableau 13).

La réforme des SGCR a un effet positif sur le score dépressif de la mère (effet positif de 1.60) des **enfants de 1-5 ans non école**. Nous observons également une réduction des interactions positives (effet négatif de 0.77) ainsi qu'une augmentation de l'inefficacité parentale et de l'aversion (effet positif de 1.03 et 0.82, respectivement). Ces effets sont de taille plus importante que ceux des parents en couple. Par exemple, pour le score dépressif de la mère et le niveau d'aversion, ils sont respectivement de 26 % sd et 39 % sd pour les one-parent et 15 % sd et 17 % sd pour les familles en couple. Les effets sont significatifs sur l'ensemble de la période post-réforme étudiée. Ces résultats sont robustes à la correction des écart-types par la méthode de Donald et Lang.

Concernant les **enfants de 5-6 ans**, la politique a un effet positif sur l'état dépressif de la mère et l'inefficacité parentale (indicés par $\star$). Les effets sont moins nombreux que quand l'enfant était non scolarisé. Lorsque l'on

corrige les écart-types, seul l'effet sur le score dépressif de la mère demeure (indicé par †).

Pour ce qui a trait des **enfants de 7-9 ans**, nous montrons que la réforme a un effet moyen négatif sur le score d'intéractions positives. Ce dernier reste d'une ampleur assez élevée, bien qu'il ait diminué depuis la période préscolaire (21 % sd versus 27 % sd, respectivement pour les 1-5 ans non école et les 7-9 ans) et qu'il ne soit significatif qu'au seuil de 10 %. L'analyse des effets par cycle montre que les effets sont présents durant l'ensemble des années post-réforme. Ces résultats sont robustes à la correction des écart-types par la méthode de Donald et Lang.

6.3 Discussion

L'objectif de cette étude est d'analyser les effets à long terme de la réforme des services de garde au Québec sur le bien-être des parents. Nous poursuivons l'étude de Baker, Gruber and Milligan (2008) en ajoutant une plus longue période d'observation et un suivi au-delà de l'âge de 4 ans. Nous discutons d'abord des effets de la politique sur les parents ayant des enfants d'âge préscolaire, puis sur ceux ayant des enfants de 5-9 ans scolarisés et enfin des résultats pour les échantillons alternatifs.

Nous montrons que la réforme des SGCR increase mother's depression score with children aged 1-5 years not school. La politique a également un effet négatif sur le comportement des parents ayant des enfants d'âge préscolaire. En effet, les parents font preuve de moins d'interactions positives et de cohérence envers leurs enfants suite à la politique. Ils ont également un comportement parental davantage inefficace et de l'aversion. Ces effets sur le bien-être parental sont significatifs sur l'ensemble de la période post-réforme étudiée. Ce dernier point suggère que, l'hypothèse d'un temps d'adaptation des parents nécessaire au programme est peu probable et que les effets de la réforme sont persistants au fil des années pour les parents ayant des enfants non scolarisés. Les effets négatifs affectant le bien-être parental semblent être directement liés aux conséquences de la réforme qui entraine une augmentation de l'offre de travail des mères et une utilisation accrue des services de garde. Comme il est mentionné dans les sections précédentes, cette politique entraina des changements dans l'allocation du temps de la mère ainsi que dans la nature and quantity of time spend with children. The adverse effects durant la période préscolaire s'étendent sur l'ensemble des cycles, montrant qu'il est difficile pour les parents de s'ajuster au programme. Les effets né-

gatifs pourraient être potentiellement liés à la structure du programme qui incite fortement les familles à utiliser de longues heures de SG à un âge précoce de l'enfant et offrant au mieux une qualité moyenne (Haeck et al., 2012). La présence d'effet long lasting pour les parents ayant des enfants non scolarisés is in line with Haeck and al. (2014) and Kottelenberg and al (2013) studies who reports significative effects on maternal labour force partipation and child care use for children d'âge préscolaire from 1998 to 2009.

L'une des contributions de notre papier est que nous étudions également les effets de la réforme sur les parents lorsque les enfants sont scolarisés. Nous montrons que la majorité des effets négatifs sur le bien-être parental, observés durant la période préscolaire, disparaissent à l'entrée de l'école. En effet, à 5-6 ans, seule une diminution des interactions positives est observée après la réforme. À 7-9 ans, la politique des SGCR a un effet nul sur le bien-être des parents, et ce peu importe l'outcome étudié. Ainsi, nos résultats suggèrent that the impact of the policy is essentially contemporary that is to say only lasts for the time when children are in child care and then disappear with the beginning of the school. Interestingly, nous montrons que seul le niveau d'intéractions positives demeure négativement affecté par la réforme lorsque les enfants entrent à l'école. Ceci tend à supposer que les parents continuent de passer moins de temps avec l'enfant, d'avoir des activités moins fréquemment avec lui, etc. Une explication possible de la persistance de cet outcome est celle de l'introduction de la maternelle à temps plein à 5 ans. Haeck, Lefebvre et Merrigan (2014) report strong evidence that, for children aged 5, implementing full-day kindergarten alone was not enough to increase maternal labour force participsation and weeks worked, but when combined with the low-fee daycare program it was, and these effects were also long lasting. Lefebvre and al. (2009) montrent également que la policy had long-term labour supply effects on mothers who benefited from the program when their child was less than 6. Néanmoins, il semble difficile de séparer les effets de la réforme des SG de celle de la maternelle à temps plein. Cependant, l'évidence présentée ici tend à montrer que c'est l'augmentation de l'utilisation des SG qui est préjudiciable aux parents plutôt que l'augmentation de l'offre de travail puisque les effets deviennent non significatifs une fois l'enfant scolarisé, malgré le fait qu'il y ait persistance sur l'offre de travail des mères, une fois que l'enfant grandit. Enfin, il semble peu probable that before-and after-school day care program ait eu un impact sur le bien-être parental puisque cela aurait également affecté les parents lorsque les enfants avaient 7-9 ans, ce qui n'est pas le cas ici. De plus, Lefebvre and al. (2009) montrent que cette

partie de la réforme a entrainé un changement de prix plus petit and that it had no effect on labour supply of mothers with only children in school.

Enfin, nous remarquons que les effets de la réforme sont de taille plus importante pour les parents ayant une faible éducation que ceux ayant une éducation élevée. Ce dernier constat vient rejoindre celui de Lefebvre and al. (2009) qui montrent que la politique de SG had life-cycle labour supply only on less educated mothers (no post-secondary education) who benefited from the program when their child was less than 6. Peut-être que les mères ayant une faible éducation sont moins enclins to endure job-related stress or that the characteristics and quality of the jobs in which mothers are engaged sont moins bons que ceux ayant une éducation élevée (Herbst and Takin, 2013). Néanmoins, il ne faut pas oublier que cette catégorie d'individus est sujet à d'autres politiques politiques familiales spécifiques au Québec ciblant les défavorisés. Par exemple, Quebec wage subsidy in 2005 remain unaccounted for. This reform a eu un impact sur les eligible families by raising their disposable income and en augmentant les incitations de travail. Dans nos résultats, nous ne remarquons pas major changes in the estimated parameters after 2005 suggesting that the effects sont essentiellement le résultat de la politique de SG. Ces dernières remarques sont également valides pour les familles monoparentales.

7 Conclusion

L'objectif de cette étude est d'évaluer les effets à long terme de la réforme des Services de Garde à Contribution Réduite sur la santé et le comportement des parents. Nous poursuivons l'étude de BGM de plusieurs façons. Premièrement, l'hypothèse d'une période d'adaptation des parents et d'une amélioration des SGCR en termes de qualité est testée avec une période d'observation plus longue ainsi que l'inclusion d'effets différenciés selon les années. Deuxièmement, nous étudions les effets sur les parents ayant des enfants de 1-5 ans non scolarisés mais également ceux ayant des enfants âgés entre 5 et 9 ans allant à l'école.

Nous montrons que la politique a augmenté les scores de dépression des mères ayant des enfants d'âge préscolaire. Les parents ont également adopté des pratiques parentales moins appropriées pour le développement de l'enfant. So, they are more hostile and aversive toward their children and have less positive interaction and consistent parenting. Aucune évidence d'amé-

lioration en termes de temps d'adaptation ou de qualité du système n'est décelée dans les résultats. Néanmoins, la majorité des effets négatifs de la réforme sur le bien-être parental disparaissent lorsque l'enfant est scolarisé. L'impact de la réforme des SGCR est donc essentiellement contemporain c'est-à-dire ne dure que le temps où les enfants sont en services de garde puis disparaissent avec l'entrée de l'école.

The findings in this paper pourraient ajouter une explication supplémentaire sur les effets négatifs de la réforme obtenus sur le développement et le bien-être des enfants québécois. Outre, l'effet de l'emploi maternel et des différents catéristiques du programme (heures intenses de SG à qualité moyenne pour les enfants de 0 an et plus), nous proposons ici un troisième mécanisme selon lequel des changements dans le bien-être maternel pourraient également affecter celui de l'enfant. Numerous studies investigate how la santé et le comportement des parents influencent les différents outcomes de développment et de bien-être de l'enfant (cognitif, comportement, santé) (National Research Council, 2000 ; Barry and al., 2005 ; Herbst and Takin, 2013). Dans ce cas, nos résultats seraient également cohérent avec l'étude de Haeck, Lebihan and Merrigan (2014). En effet, ces derniers étudient l'effet de la réforme du Québec sur le bien-être de l'enfant à long terme. The authors show that the reform has a negative effect on children's health and behavior aged 0-4 years but insignificant at 5-9 years. Interestingly, they report that adverse effects for children's outcomes aged 0-4 years are significant durant toute la période post-réforme (2000-2009). Ceci converge avec nos résultats because comme les parents sont affectés négativement durant tout le temps où l'enfant est en SG, cela joue sur les relations parents-enfants mais les effets disparaissent, une fois l'enfant scolarisé, aussi bien pour l'enfant que pour le parent.

Il serait intéressant, dans des recherches futures, d'aborder ce sujet d'un point de vue plus structurel. En l'occurrence, quels sont les mécanismes qui conduisent à ces résultats ? Est ce la qualité des services de garde, leur durée, leur intensité ou l'emploi maternel ?

Finally, it might be useful to understand comment la politique a changé l'allocation du temps maternel, notamment dans la nature de ses activités et du temps accordé aux enfants.

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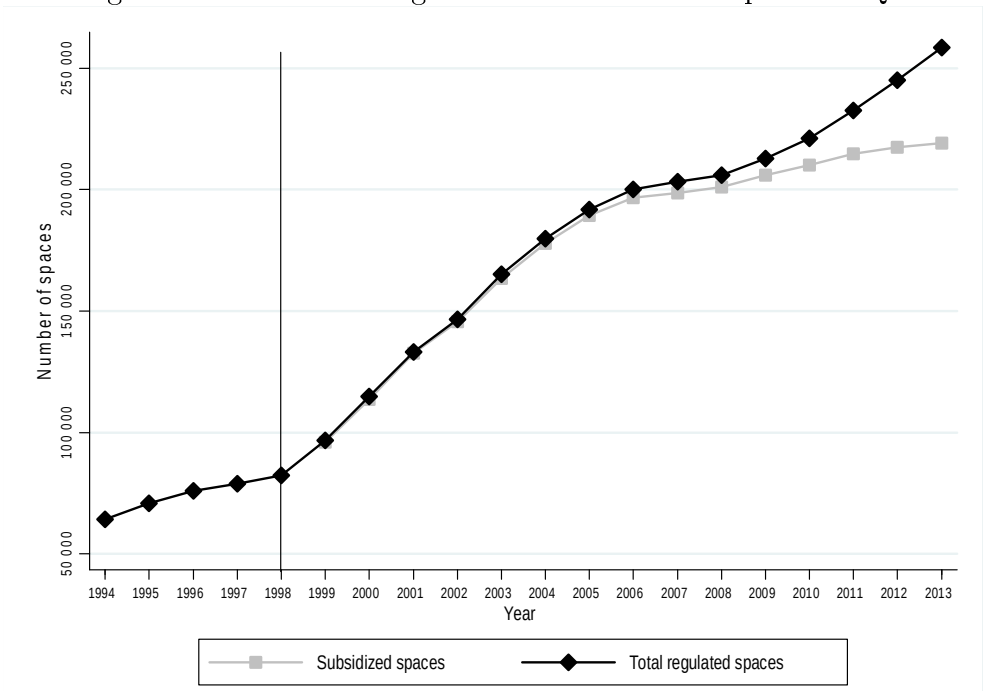
Figure 1 – Number of regulated and subsidized spaces in Quebec



Notes: This table shows the evolution of regulated spaces between 1994 and 2013 and subsidized spaces (low-fee spaces) from 1998 to 2013. The number of spaces is measured on March 31st of each year. Subsidized spaces are those that apply an unique fee of 5 dollars per child per day (Centre-based CPEs and Home-based CPEs). The vertical line marks the first post-reform year. In 1997, none of the existing regulated spaces is low-fee (unsubsidized).
Sources: Lefebvre and Merrigan (2008a) and Ministère de la Famille et des Ainés (MFA) du Quebec.

TABLE 1 – Characteristics of regulated child care spaces by province in 1998, 2001 and 2008 (estimates)

		Number of regulated spaces[1]		Number of subsidized spaces[2]	Provincial subsidy (in millions $)[3]	Median daily fee infant-child ($)[4]	Net income threshold for subsidy ($)[5]	Number of children aged 0 to 5
Province/Year	1998	2001	2008	2008	2008	2008	2008	2007
Newfoundland Labrador	3,740	3,632	5,237	2,078	19,8	21-45	37,600	28,000
Prince Edward Island	1,691	2,052	3,565	1,786	6,2	26-32	53,040	8,600
Nova Scotia	11,163[6]	11,464[6]	11,023	2,863	37,1	24-27	34,992	49,400
New Brunswick	9,204[6]	5,970	8,344	5,424	26,2	22-25	41,000	40,100
Quebec	82, 302	133,250	205,917	201,166	1,578.3	7	N.A	468,000
Ontario	126,500	118,110	179,364	126,097	780,4	25-36	Multiple[7]	812,400
Manitoba	16,593	18,051	19,615	9,600	105,6	16-28	45,777	77,600
Saskatchewan	6,205	6, 321	8,174	3,718	47,1	20-25	72,720	64,400
Alberta	47,033	47,693	54,499	10,616	105,8	23-30	79,560	246,300
British Columbia	52,574	53,416	59,305	14,922	216,7	26-35	50,256	244,200
Canada	357,005	399,959	555, 043	378,270	2,923.10	-	-	2,039,000

1 : Center and family-based full and part-day child care for preschool-aged children

2 : Number of children in regulated child care receiving subsidies

3 : Provincial allocation (fee subsidy + one timing funding + recurring funding) for regulated child care in 2007-08.

4 : Median daily fee (infant- older children). For Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, we divided the monthly fee by 22.

5 : Break-even point of eligibility for fee subsidy (net income 2008), 2 parents, 1 or 2 children. Saskatchewan and Alberta use gross income and not the net

6 : The number of regulated spaces includes children of school-age to Nova Scotia in 1998 and 2001 and for New Brunswick in 1998

7 : The subsidy in Ontario depends on the cost of child care and the net income of the family

Sources : Haeck, Lefebvre and Merrigan (2013) ; Beach, Friendly and al. (2009)

TABLE 2 – Éligibilité aux SGCR selon l'âge de l'enfant et le cycle

	Wave							
Age	Wave 1 (1994-95)	Wave 2 (1996-97)	Wave 3 (1998-99)	Wave 4 (2000-01)	Wave 5 (2002-03)	Wave 6 (2004-05)	Wave 7 (2006-07)	Wave 8 (2008-09)
0	×	×	×	E(0)	E(0)	E(0)	E(0)	E(0)
1	×	×	×	E(0)	E(1)	E(1)	E(1)	E(1)
2	×	×	×	E(0)	E(2)	E(2)	E(2)	E(2)
3	×	×	E(0)	E(1)	E(2)	E(3)	E(3)	E(3)
4	×	×	E(0)	E(1)	E(2)	E(4)	E(4)	E(4)
5	×	×	E(1)	E(2)	E(3)	E(4)	E(5)	E(5)
6	×	×	×	E(1)	E(2) ⊘	E(3) ⊘	E(5)	E(5)
7	×	×	×	×	E(2) ⊘	E(3) ⊘	E(4)	E(5)
8	×	×	×	×	E(1)	E(2) ⊘	E(3)	E(5) ⊘
9	×	×	×	×	×	E(2) ⊘	E(3)	E(4) ⊘

Notes : This table shows the eligible children in Quebec to the low-fee daycare reform (indicated by E) and non-eligible children in Quebec (indicated by a symbol ×) according to children's age and wave. Numbers in parentheses indicate the number of years of eligibility. For example, for a 5-year child in wave 5 (and therefore born in 1997), he was eligible for three years of low-fee child care. The index E(0) refers to the fact that the child is eligible for a few months, not a year. The symbol ⊘ means that the child is eligible for child care at $5, however, the data for this age group in this cycle are not available in NLSCY data.

TABLE 3 – Dependant Variable Summary Statistics of children aged 1-5 no school, 5-6 years school and 7-9 years (two-parents families)

		Children aged 1 to 5 not school					Children aged 5 to 6 school					Children aged 7 to 9				
		Quebec		Rest of Canada			Quebec		Rest of Canada			Quebec		Rest of Canada		
		Pre	Post	Pre	Post		Pre	Post	Pre	Post		Pre	Post	Pre	Post	
Variable	Range	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.
Parent Health																
Mother in excellent health	0-1	0.41 (0.49)	0.40 (0.49)	0.39 (0.49)	0.38 (0.48)	43,935	0.39 (0.49)	0.39 (0.49)	0.38 (0.48)	0.35 (0.48)	17,433	0.36 (0.48)	0.38 (0.49)	0.35 (0.48)	0.34 (0.48)	19,718
Father in excellent health	0-1	0.45 (0.50)	0.43 (0.49)	0.40 (0.49)	0.39 (0.49)	43,327	0.47 (0.50)	0.39 (0.49)	0.36 (0.48)	0.36 (0.48)	17,130	0.40 (0.49)	0.34 (0.47)	0.34 (0.47)	0.34 (0.47)	19,458
Mother's depression score	0-36	4.05 (4.59)	4.01 (4.81)	4.52 (4.97)	3.74 (4.44)	42,826	3.70 (4.40)	3.48 (4.66)	4.13 (4.69)	3.50 (4.46)	17,142	3.74 (4.84)	3.40 (4.46)	3.98 (4.97)	3.43 (4.47)	19,444
Parent Behavior																
Family Dysfunction Index	0-36	7.18 (5.07)	7.73 (5.11)	7.83 (5.14)	8.15 (5.04)	43,298	7.27 (5.12)	7.40 (5.08)	7.86 (5.10)	7.82 (5.08)	17,241	7.56 (5.15)	7.10 (4.92)	8.25 (4.94)	7.65 (5.10)	19,518
Positive Interaction (2 years or more)	0-20	15.89 (2.74)	15.72 (2.45)	15.89 (2.63)	16.35 (2.35)	32,841	13.90 (2.59)	13.94 (2.41)	13.73 (2.57)	14.47 (2.51)	17,609	12.25 (2.67)	12.71 (2.44)	12.48 (2.57)	13.10 (2.60)	19,825
Hostile/Ineffective parenting (2 years or more)	0-25	8.33 (3.87)	8.53 (3.31)	9.32 (3.72)	8.76 (3.39)	32,298	8.54 (3.74)	8.33 (3.26)	9.24 (3.72)	8.68 (3.36)	17,387	8.54 (3.61)	8.32 (3.26)	8.87 (3.70)	8.71 (3.65)	19,518
Consistent parenting (2 years or more)	0-20	14.11 (3.27)	14.67 (3.01)	14.71 (3.37)	15.55 (3.07)	31,883	13.91 (3.07)	14.87 (2.94)	15.14 (3.31)	15.80 (2.98)	17,221	14.33 (3.17)	15.00 (3.03)	15.52 (3.11)	16.01 (3.00)	19,302
Aversive parenting (2 years or more)	0-20	8.29 (1.96)	7.78 (1.94)	9.24 (2.23)	8.33 (2.10)	32,663	8.35 (1.83)	7.71 (1.81)	9.03 (2.06)	8.38 (2.01)	17,542	8.11 (1.74)	7.56 (1.69)	8.75 (1.90)	8.19 (1.97)	19,771

Notes : This table shows the range, number of observations, the mean and standard deviation (in parentheses) for each variable of interest for Quebec and the Rest of Canada before and after the reform. Each column represents an age category of child : 1-5 years no school, 5-6 years school and 7-9 years. Periods pre and post reform is based on Table 2. Wave 3 is excluded. Descriptive statistics concern here two-parents families and are weighted.

TABLE 4 – Summary Statistics of children aged 1-9 (two-parent families)

Variable	Child aged 1-9			
	Quebec		Rest of Canada	
	Pre-Policy	Post-Policy	Pre-Policy	Post-Policy
Child is a boy	0.51	0.51	0.51	0.51
Mother				
Less than high school	0.16	0.11	0.10	0.08
High school diploma	0.18	0.15	0.21	0.19
Some post-secondary	0.24	0.16	0.27	0.14
Post-secondary degree	0.42	0.58	0.42	0.59
Age 14-24 at birth	0.21	0.20	0.17	0.16
Age 25-29 at birth	0.41	0.38	0.38	0.32
Age 30-34 at birth	0.29	0.30	0.32	0.35
Age 35 or more at birth	0.09	0.12	0.13	0.18
Immigrant	0.08	0.11	0.19	0.21
Father				
Less than high school	0.19	0.15	0.13	0.10
High school diploma	0.19	0.18	0.20	0.21
Some post-secondary	0.21	0.16	0.23	0.13
Post-secondary degree	0.42	0.52	0.44	0.56
Age 14-24 at birth	0.08	0.09	0.08	0.07
Age 25-29 at birth	0.33	0.29	0.28	0.24
Age 30-34 at birth	0.38	0.36	0.38	0.37
Age 35 or more at birth	0.21	0.26	0.27	0.32
Immigrant	0.09	0.13	0.19	0.20
Family				
Rural Region	0.18	0.15	0.16	0.12
Region $<$ 30K	0.12	0.11	0.16	0.15
Region 30-99,999K	0.09	0.09	0.07	0.09
Region 100-499K.	0.08	0.06	0.22	0.19
Region $>$ 499K	0.53	0.58	0.39	0.45
None older sibling	0.48	0.47	0.42	0.43
One older sibling	0.36	0.38	0.36	0.39
At least two older siblings	0.16	0.16	0.22	0.18
None younger sibling	0.58	0.66	0.56	0.65
One younger sibling	0.34	0.29	0.34	0.29
At least two younger siblings	0.09	0.05	0.09	0.05
Same age siblings	0.03	0.02	0.02	0.03
N	4,706	8,367	20,551	46,249

Notes : This table shows the weighted summary statistics weighted for children, mothers and fathers and families. The statistics are divided by Quebec and the Rest of Canada for the pre-reform and post-reform according to Table 2. Wave 3 is excluded. This table includes all children 1-9 years from two-parents families. All statistics are percentages.

Annexe : Comportement des parents et des pratiques parentales.

(1) Score de dysfonctionnement familial. "Il s'agit d'une échelle qui sert à mesurer différents aspects du fonctionnement d'une famille soit, la résolution de problèmes, la communication, les rôles, la réceptivité affective, la participation affective et la maitrise du comportement" (Statistiques Canada, 1996). Les questions posées sont sur l'opinion de la famille à : planifier des activités ensemble, à exprimer ses sentiments, à être accepté tel que l'on est, à se confier, etc. Un score élevé dénote un dysfonctionnement de la famille.

(2) Interactions positives. Le score d'interaction positive repose sur cinq questions auxquelles "on a demandé aux parents à quelle fréquence ils s'adonnaient aux activités suivantes ou ils posaient les gestes suivants : féliciter son enfant, parler ou jouer pour s'amuser pendant cinq minutes ou plus, rire ensemble, faire quelque chose de spécial qui plait à l'enfant, faire du sport, s'adonner à un passetemps et jouer à des jeux avec son enfant" (Statistiques Canada, 1998).

(3) Inefficacité parentale. Le score d'inefficacité parentale repose sur sept questions auxquelles on a demandé aux parents à quelle fréquence ils posaient les gestes suivants : être contrarié quand l'enfant désobéit, désapprouver l'enfant en lui parlant, s'emporter quand ils punissent l'enfant, avoir de la difficulté à contrôler l'enfant, etc.

(4) Cohérence parentale. Le score de cohérence parentale repose sur cinq questions auxquelles on a demandé aux parents à quelle fréquence ils posaient les gestes suivants ou observaient les faits suivants : s'assurer à ce que l'enfant obéisse, laisser passer les choses pour lesquelles l'enfant aurait du être puni, l'enfant a réussi à éviter une punition lorsqu'il le souhaite, l'enfant se moque de la punition, etc .

(5) Style rationnel (aversion) des parents. Le score rationnel des parents (aversion) repose sur quatre questions auxquelles on a demandé aux parents à quelle fréquence ils posaient les gestes suivants ou observaient les faits suivants : crie quand l'enfant se comporte mal, lui infliger des punitions corporelles, lui expliquer d'autres façons de se comporter qui sont acceptables, etc.

Universal child care and longer-run effects on parental health and behaviors : Evidence from a Canadian universal child care program

Catherine Haeck [*] Laëtitia Lebihan [*] Pierre Lefebvre [*]
Philip Merrigan [*†]

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In this paper, we study the long-run impact of a universal child care policy in Quebec on parental health and parenting practices. Using data from the National Longitudinal Survey of Child and Youth, we follow treated families for more than 9 years and investigate the impact well beyond the first few years of the policy. A non-experimental evaluation framework based on multiple pre- and post-treatment periods is used to estimate the policy effects. We show that the policy increased mothers' depression scores with preschool children as well as scores of inappropriate parenting behavior. The policy increased hostile and aversive parenting and reduced positive interaction and consistent parenting. However, negative effects of the program on parental behaviors vanish when the child is in school. Moreover, we find that this pattern persists even ten years after the implementation of the reform.

Key words : universal child care, parental health and behaviors, longer-run effects, child care policy, natural experiment.

JEL Classification : I31, J18, J20

[*]Université du Québec à Montréal. Department of Economics, Université du Québec à Montréal, CP 8888, Succursale Centre-Ville, Montréal, Qc, Canada, H3C 3P8. The study is based on Statistics Canada's National Longitudinal Survey of Children and Youth (NLSCY). The data are available at the Quebec Inter-university Center for Social Statistics (QICSS). All computations and interpretation of these data are our own. This research was funded by the Fonds québécois de la recherche sur la société et la culture and the QICSS.

[†]Corresponding author : merrigan.philip@uqam.ca.

1 Introduction

In the last decades, there has been a sharp increase in the participation rate of mothers in the labor market in developed countries. In Canada, the employment rate of mothers with children under the age of six has risen from 31.4 percent in 1976 to 67.8 percent in 2012 (Canadian Labour Force Survey). Although this has had a positive effect on family incomes, it has also made parenting a more demanding and stressful task given the increased time and pressure from work. Concurrently, a growing demand for child care by parents raised the attention of policy makers toward public or subsidized child care programs. The idea that child care subsidies should no longer be limited to low-income families, but be universal, as it is the case in most European countries, is slowly emerging as a model for North American governments, particularly in Canada. Moreover, advocates of a universal child care system argue that it is important to invest in young children through quality child care because early childhood is a critical period of human development and that the returns are higher when interventions are performed in the early years (Cunha and Heckman, 2010 ; Baker, 2011).

Studies estimating the effects of universal child care policies have focused mainly on their impact on maternal employment and child development (see Baker (2011) for a review). However, as explained by Herbst and Tekin (2014), a full evaluation of child care subsidies requires a thorough understanding of the ways in which subsidies influence both parents and their children. When mothers reallocate their time from home to the labor market, this is accompanied by a change in the nature of time spent with the child, affecting not only children's well-being but also parents' well-being or behavior. Indeed, there is a vast literature showing how maternal well-being affects by itself a child's well-being and his development (NICHD, 1999, 2003 ; Almond and Currie, 2011).

The first major study having examined the effects of universal child care on both child and parental outcomes is that of Baker, Gruber and Milligan (2008) who perform an evaluation of the major child care reform in the province of Quebec in Canada implemented in the late nineties. In 1997, the Quebec government started the graudual implementation of a low-fee child care policy. From then on, child care spaces could be purchased by parents for $5 per child per day. The reform was phased in to include all Quebec's children less than 6 years of age (not in publicly provided kindergartens) as of September 2000. This policy had the effect of draining a large proportion of children from informal care and maternal care towards regulated child care. Indeed, the number

of regulated child care spaces in Quebec increased from 78,864 in September 1997 to 258,366 as of March 2013 (Ministre de la Famille et des Ainés, 2013). More importantly, as a result of the policy, women's labor force participation increased by 14.5 percent in Quebec by 2003 (Baker et al., 2008).[1] No policy of this magnitude affecting mothers of preschool children was enacted in the other Canadian provinces between 1998 and 2008 (Haeck et al., 2013).

Baker et al. (2008) also show that the reform had a negative effect on several parental (with at least one child 0-4) and child (children 0-4) outcomes. In particular, the policy had a negative effect on parents' health and on parenting behavior. In a more recent study, Kottelenberg and Lehrer (2013) confirm these results by including additional years of data (up to 2007) and alternative estimation methods. Although Baker et al. (2008) and Kottelenberg and Lehrer (2013) study the effect of the policy on parents' oucomes, there is little emphasis on these results and the authors focus more on maternal employment and children's well-being. We propose an extension of Baker, Gruber and Milligan (2008) study (henceforth referred to as BGM) in two ways.

First, the effects on parents are studied over a longer observation period, namely until 2009. In fact, the effects measured by BGM are based on the period 2000-03, the early years of the program implementation, which could have generated some frictions. A period of adjustment should be necessary for both parents and children as well as for the government for the policy to function efficiently. Thus, a range of parenting behaviors and health indicators may change, especially in the short-run, as subsidized women with little employment experience adjust to the dual demands of paid work and childrearing (Herbst and Tekin, 2014). Also, the network has expanded significantly since 2000-2003, efforts have been undertaken to try to improve quality in child care services, and the number of families benefiting has greatly increased. Thus, we verify whether the effects estimated by BGM is the result of a transition to the new child care policy or if they persist over time. Kottelenberg and Lehrer (2013) extended the observation period to 2007 but estimated the average effect of the reform on all treated irrespective of the treatment period. Our empirical strategy account for the gradual implementation of the policy and of the possibility that the effects of treatment may be different each year since the beginning of the policy.

Second, contrary to BGM and Kottelenberg and Lehrer (2013) who focus their

1. Using the Survey of Labour and Income Dynamics (SLID) data, Lefebvre and Merrigan report similar results : an increased participation of women in the labor market of 13 percent and an increase in annual hours worked of 22 percent (Lefebre and Merrigan, 2008).

study only on children aged 0 to 4, we extend the analysis to parents with children aged between 5 to 9 years. To take into account a major parental leave reform in 2000 across Canada and in 2006 in Quebec, we exclude mothers of children below the age of 1 from our analysis. We also include 5 year olds not in school in our sample (not included in the BGM sample). Subsequently, we estimate the effects of the reform on parents when a child enters school (at age 5 or 6), and when the child is 7-9 years of age. This analysis beyond the age of 5 can determine whether the adverse effects identified for parents during pre-school years persist during elementary school years or otherwise dwindle over time. To our knowledge, studies on the effects of universal child care on parental outcomes, as the child gets older, are very scarce. Documenting the long run effects of universal child care on parents is crucial to our understanding of the overall impact of such reforms, in particular once the parents are no longer directly affected by the program. Thus, we analyze the effects of the reform on parental outcomes for parents with children from three age groups : 1-5 years old not in school, 5-6 years old and 7-9 years old, the latter two in school.

These two features allow for a consideration of the longer-run effects of Quebec's reform in two ways : long-run effects in terms of network expansion and long-run effects on the life of beneficiaries. To our knowledge, this is the first study addressing the longer-term effects of the low-fee child care reform on parental health and parental practices. [2]

We use data from the NLSCY (National Longitudinal Survey of Children and Youth), which constitute a representative sample of the Canadian population of children. To estimate the effects of the child care program, we rely on a non-experimental evaluation framework based on multiple pre-and post-treatment periods. So, we compare Quebec parents before and after the reform to comparable parents in the Rest of Canada.

We show that the policy increased mothers' depression scores with preschool children as well as scores of inappropriate parenting behavior. The policy increased hostile and aversive parenting and reduced positive interaction and consistent parenting. However, negative effects of the reform on parental outcomes vanish when the child is in school. This suggests that the reform had no effects on parents, who benefited from the program when their child was less than 6, once their child is in school.

2. See Lefebvre, Merrigan and Verstraete (2009) and Lebihan, Haeck and Merrigan (2015) for an analysis of long-term effects of Quebec's family policy on maternal labor supply and child well-being, respectively.

The outline of the paper is as follows. Section 2 reviews evidence from prior research and discusses the mechanisms by which such child care subsidies can influence parental outcomes. Section 3 describes the Quebec family policy. Section 4 presents the data set. In Section 5, we describe the empirical strategy. Econometric results on the impact of the program on parental outcomes and their interpretation are presented in Section 6. Section 7 concludes the paper.

2 Previous research on child care, maternal employment and parental outcomes

This section summarizes recent empirical research on the link between child care, maternal employment and parental outcomes. First, we review literature on the Quebec reform. Then, we review the evidence of maternal employment and child care (especially subsidized child care) on parental outcomes in other countries.

BGM analyse the impact of the Quebec child care policy on the use of child care, maternal employment and several outcomes for children and parents. They use the first two waves (1994-95 and 1996-97) and the last two waves (2000-01 and 2002-03) of the NLSCY, available at the time. Their study focuses on children 0-4 years old or parents with a child of that age. They show, among other things, that the new program increased mothers' depression scores and decreased the likelikood that fathers report being in excellent health. They also find that the Quebec family policy increased hostile and aversive parenting and decreased parental consistency.[3] Kottelenberg and Lehrer (2013) extend BGM by adding additional years (2004-05 and 2006-07). Using the same method as BGM (difference-in-difference), they confirm the negative effects of the family policy on Quebec's child and parental outcomes. Using alternative methods of estimation, they also show that most of the negative impacts are driven by families who only attended child care as a result of the policy. Brodeur and Connolly (2013) also study the effects of the policy change on parental subjective well-being. Using the Canadian General Society Survey, the authors estimate a triple-difference model using differences pre- and post-reform between Quebec and the Rest of Canada, and between parents with young children and those with older children. They find adverse effects of the policy on parents' life satisfaction.

Several studies on parental outcomes also found in other developed countries. Herbst

3. See Table A.1 in the Appendix for more details on these parental outcomes.

and Tekin (2014) estimate the impact of child care subsidy receipt on maternal health and the quality on child-parent interactions, using data from three nationally representative surveys in the United States. Their study is based on a program named the Child Care and Development Fund (CCDF) and these subsidies are granted conditional on the parents being engaged in paid employment, job training or education. Their analysis focuses on unmarried mothers because the program aims at raising work levels among economically disadvantaged women with young children. The authors report that child care subsidies are associated with worsened maternal health (overall health, anxiety, depression and parenting stress) and poorer interactions between parents and their children (psychological and physical aggression toward their children). Using data from the German Socio-Economic Panel, Kröll and Borck (2013) examine how mothers' health and mother-child interaction are affected by whether they use formal day care or not. Their estimation strategy consists in using local aggregate formal child care usage rates as an instrument for individual formal child care usage. They show that mothers are in a worse physical condition if their children attend formal care, but the effects are insignificant for mothers' mental health. As to mother-child interactions, they report that mothers with children in formal care interact with them more frequently. More generally, evidence shows that more hours spent in child care when children are aged 6 to 36 months is associated with lower maternal sensitivity and less positive engagement of the mother for her child. In contrast, when children reach the age of four and a half years until the first grade, the relationship between the duration of attendance and mother-child interaction depends on the race of children (NICHD, 2003). Therefore, more non-maternal child care experience across the first 3 years was associated with less maternal sensitivity and less positive engagement of mothers for white children, but it was the inverse for non-white children up to first grade. Negative associations between hours of care and sensitivity diminished over time for all children. Finally, Chatterji, Markowitz and Brooks-Gun (2013) analyse the effects of early maternal employment on maternal health and well-being when children are 6 months old in the United States. They show that maternal work hours are positively associated with depressive symptoms and parenting stress, and negatively associated with self-rated overall health. Interestingly, these effects do not seem to persist over time (Chatterji et al., 2011, 2013).

In sum, previous studies seem to suggest that child care subsidies and, more generally, maternal employment and child care use worsens maternal health and mother-child interactions. Herbst and Tekin (2014) discuss how child care subsidies receipt

affects parental well-being. First, there is an effect on time allocation caused by increased work (Brodeur et al., 2013). In this regard, the Quebec policy leads to a substantial change in maternal time allocation, from non-market activities (including time spent with children and leisure) to the formal labor market. Subsidized mothers may spend less time in leisure and relaxation activities. Second, change in child care subsidies may affect parental outcomes through increased household income, enlarging consumption possibilities. [4] Third, child care subsidies may change the nature and quantity of maternal time spent with children (BGM). Indeed, the Quebec policy has led to an increase in hours spent in child care for the child and the number of weeks worked for the mother (Haeck et al., 2015). The time spent by the mother with the child is thereby reduced, and therefore this may have implications for child and maternal well-being. Going back to the labor market, we know a busier schedule leads to more stress, especially if we must also reconcile work and family. Higher stress levels worsen health outcomes and reduce the quality of child-parent interactions. Habits and types of activities between the child and the parent can be changed, at least in the short-run, until the mother is physically and psychologically fit to work again, or work more intensively (Herbst and Tekin, 2014). Finally, long hours in day care, if of insufficient quality, may affect the child's behavior and temperament at home, increasing tensions within the household and affecting parental health and behavior.

3 The Quebec 1997 child care policy

We provide below a brief overview of Quebec's child care policy. [5]

In the late 1990's, the government of Quebec initiated the gradual implementation of a universal low-fee child care program for children less than 6 years old not in kindergarten. This low-fee was established at $5 per day per child. In September 1997, only children aged 4 as of September 30^{th} 1997 were eligible for low-fee child care. In September 1998, children aged 3 (on September 30^{th} 1998) were eligible for subsidized child care. In September 1999, children aged 2 (on September 30^{th} 1999) were also eli-

4. Using Statistics Canada's annual 1997 to 2009 Survey on Households Spending, Haeck, Lefebvre and Merrigan (2014) document the increase in the maternal share of total household income in Quebec and use an instrumental variables approach to estimate the impact of the share of female income in the household on intra-household expenditures. The authors report that more income in the hands of mothers impacts the expenditure structure within the household by raising budget shares on expenditures related to children, family goods and services with positive externalities.

5. For more details, please refer to BGM, Lefebvre and Merrigan (2008) and Haeck et al. (2015).

gible for low-fee child care. Then, in September 2000, children aged less than 2 years old were eligible for low-fee child care. Thus, by September 1^{st} 2000, all children under 71 months became eligible for subsidized child care, with the exception of children who were 5 years old (60 months) by September 30^{th} and who were registered in a public kindergarten. In 2004, the price of low-fee child care was increased from \$5 to \$7 per day per child.

The policy pursued two objectives : i) increase mothers' labor force participation while balancing the needs of the workplace and the home, and ii) enhance child development and equal opportunities. Basically, the government set up strategies allowing, gradually, preschool-age children to attend regulated child care. One important piece of the puzzle was the development of center-based child care services as "Centre de la Petite Enfance (CPE)" (Centers for young children) and home-based care with a regulated provider supervised by the CPE of the same neighborhood (ideally). Concurrently, the government of Quebec implemented new standards such as the necessity for providers to hire qualified employees, the conformity to a children/educator ratio according to the age of children, and the introduction of educational training programs specializing in child care in post-secondary institutions (Giguère and Desrosiers, 2010). Overall, the total number of regulated spaces more than tripled between 1997 and 2013, from 78,864 to 258,366 regulated spaces, and significant public funds are allocated to Quebec's child care policy (\$2.3 billion for fiscal year 2012-2013) (Treasury Board of Canada, Budget 2012-2013). In contrast, the number of subsidized child care spaces in the Rest of Canada (RofC) was relatively small compared to Quebec and changed little between 1997 and 2009 (Haeck et al., 2015). This reform drastically changed maternal labour force participation and the way in which preschool children were cared for in Quebec, while no comparable changes were observed elsewhere in Canada. Figure 1 presents the mean hours (conditional and not conditional to the use of child care) per week that children aged 1 to 4 spent in their primary care arrangement, but also the labor force participation of mothers (two-parent and single-parent families) and fathers (in two-parent families) for these children in Quebec and the RofC. Haeck et al. (2013, 2015) show that not only more children started to attend child care in Quebec following the reform, but the intensity of care for those attending child care increased. Concerning the labor force participation, the main changes are for mothers. Indeed, for two-parent families in Quebec, mothers' labour supply increased in most waves, starting at 55 percentage points in 1994 and reaching 76 percentage points in 2008. In contrast, no significant changes in the hours of care and maternal labor force participation has occured in the

RofC. For single mothers, there are large increases of labor force participation for both Quebec and the RofC, but the original gap, in favour of mothers in the RofC is totaly closed by 2008.

This child care reform was combined with other family programs in Quebec for school-age children. First, free public full-day kindergarten for children aged 5 replaced half-day kindergarten. Second, in September 1998, before- and after-school daycare began to be offered to children aged 5 to 12 for the same fee as the low-fee child care ($5 per day per child in 1998 and $7 in 2004). However, the new child care subsidies for children less than 5 years-old are by far the most significant aspect of the new family policy.

4 Data

To estimate the long-run effects of the reform on parents, we use the National Survey Longitudinal Children and Youth (NLSCY). The NLSCY is a panel (with several panels) survey that measures a wide range of characteristics related to Canadian children's development and well-being. This biennial survey started in 1994-95 (wave 1) and ended in 2008-09 (wave 8). The NLSCY contains both child and parental outcomes, and extensive varaibles related to parental labour supply, child care use and other demographic characteristics.

Given the policy phase-in, children and parents were treated differently by the policy over the years. Table 1 summarizes the various treament groups by presenting the eligibility of children according to their age and the NLSCY wave they are sampled from. The grey shaded area highlights the post-reform years while the unshaded area refers to the pre-refom years. Numbers indicate the number of years of eligibility for subsidized child care. To calculate the number of eligibility years, we always use December 31 of the first year of the two-year period as reference.[6] For example, for wave 4 (2000-01), the reference point is the child's age on December 31, 2000. The index 0.5 refers to the fact that the child is eligible for a few months, not a year. In order to avoid overlapping of treated and untreated in the same wave, we exclude wave 3 (1998-1999) for children 0-6 years old, as BGM. Moreover, these children were only eligible to low-fee child care for a few months at the end of 1998 and this period corresponds to a phase-in of the

6. The NLSCY surveys are conducted over a few months. They start in the fall of the first year of the two-year period and end in the spring of the second year. For example, for wave 4 (2000-01), data collection started in September 2000 and ended in April 2001.

program due to the restrictions on the number of subsidized spaces available and age eligibility. It was only in 2000 (wave 4) that all children under 71 months became eligible for subsidized child care. For parents with children aged 7 to 9, we consider wave 3 as a pre-reform period (since children are not treated) and exclude wave 4 for the same reasons.[7] The term n.a (not available) referes to cases where, although children were eligible for low-fee child care, data for this age group in this wave are not available in the NLSCY. Table 1, clearly shows that the number of years young children spend in low-fee child care increased over time. Indeed, parents and children aged 0-4 years in BGM were treated only a few months to 2 years (wave 4 and 5). However, in this study, we analyze the impact of the reform on parents with children aged 5 to 9 eligible to low-fee child care since birth and which were therefore highly exposed to the reform (from 1 to 5 years of treatment). Regarding preschoolers, we add an additional 6 years, which also extends the treatment period from a few months to 5 years for these children and parents (compared to a few months to 2 years for BGM).

Given data availability and eligibility for subsidized child care that depends on the age of the child, we focus our analysis on the parents of children aged 1 to 9 years old. The evaluation is performed for three separate age groups : parents with 1-5 year-olds not in school, 5-6 year-olds in school, and 7-9 year-olds. Since the low-fee child care reform was gradual, the policy depends on the age of the child and the period. Thus, it seems reasonable to perform the regressions according to the age of the children and model the effects to be time-dependent. In contrast to BGM and Kottelenberg and Lehrer (2013) study , we exclude from our samples children 12 months old or less that may be affected by the major parental leave reform introduced in Quebec in 2006[8]. In addition, the majority of parents with children under one benefit from federal parental leave. We also include parents with 5 year-olds not in school in the sample of preschool children as they are likely to to be in subsidized child care before being eligible for kindergarten.[9] Since the majority of children aged 5 attend kindergarten in Canada, we also want to estimate any persistent effects of the low-fee child care reform at the beginning of the first year of school (also including parents of children aged 6). Once

7. The results are similar if we include wave 3 for children aged 0 to 6 and wave 4 for children aged 7-9.

8. In January 2006, the Government of Quebec established a new Quebec Parental Insurance Plan (Régime Québécois d'Assurance Parentale, RQAP). The RQAP has several advantages in terms of the population covered, the rate of income replacement and flexibility as compared with the then existing federal arrangement.

9. The results are similar if we consider the following age categories : 0-4 years, 1-4 years and 0-5 years not in school. The results are available on request .

past the critical stage of the first years in school, we estimate the effects of the policy on parents with children aged 7 to 9. This basically explains our three samples : parents of children 1 to 5, not is school, of children 5 to 6, immediately after child care, and finally of children 7 to 9. Note that the parents with children observed in the latter part of the survey were exposed for a much longer period to the policy than parents with children in 2000 (for example a 4 year old in 2000 was 2 in 1998 at a time when the policy did not cover children aged 2 in 1998).

Building off BGM's study, we also focus on two-parent families to avoid interference with other policies targeting low-income families (largely represented by single-parent families). Various provincial and federal reforms have been implemeted since 1997 and could interact with the low-fee child care reform. Baker et al. (2005) and Milligan and Stabile (2007) show that changes in family/child benefits have a statistically significant impact and relatively large impact on different outcomes for single-parent families, but little on two-parent families. In addition, the Government of Quebec introduced a new work incentive policy in 2005. This work premium aims to support and develop the work effort of low-wage workers, but also to encourage people to exit welfare into work (Quebec's Ministry of Finance of Quebec, 2004). Therefore, since any specific policy shock in Quebec coinciding with the universal child care reform may bias our results, we focus as BGM does on two-parent families. Subsamples according to maternal education and family type are also constructed for studying the heterogeneity of the effects of the reform. All outcomes are reported by the person most knowledgeable about the child (almost always the mother).

To measure the effect of the policy on parents' health, we choose the following outcomes as dependent variables : (1) the mother's health status is excellent (1 : excellent, 0 : not excellent) ; (2) the father's health status is excellent (1 : excellent, 0 : not excellent) and (3) the mother's depression score (score ranging from 0 to 36). A high score indicates the presence of symptoms of depression. All questions on parents' health are asked to households with children aged 1 to 9.

As for parental behavior and parenting per se, several measures are available : (1) the family dysfunction index (score ranging from 0 to 36) ; (2) positive interaction (score ranging from 0 to 20) ; (3) hostile/ineffective parenting (score ranging from 0 to 25) ; (4) consistent parenting (score ranging from 0 to 20) and (5) aversive parenting (score ranging from 0 to 20). A high score for (2) and (4) indicates positive parental behavior for child well-being while the opposite is true for (1), (3) and (5). The questions on parents' behavior are asked when children are 2-9, except for the family dysfunction

score which is for parents with children 1-9. Details and summary statistics for parental outcomes before and after the reform in Quebec and the RofC are presented in Tables A.1 and A.2 respectively.

We use the same control variables as BGM in our regression analysis to make sure that any differences between our results and theirs is not due to controls or methods. The control variables are : the sex of the child, the mother and father's highest level of education (less than a high school diploma, high school diploma, some post-secondary education, with post-secondary diploma (omitted)), the age group of the mother and father at the child's birth (14-24 years-old (omitted), 25-29, 30-34, 35 or more), a dummy for whether or not the mother or father was born in Canada, the size of the area of residence (five groups from rural population to 500000 residents or more (omitted)), the presence of older children (no older child, omitted), one older child, at least two older children, the presence of younger children, no younger child (omitted), one younger child, at least two younger children, the presence of children of the same age and dummies for the age of the child. Summary statistics for parents with children aged 0-9 years in Quebec and the RofC in pre- and post- reform periods are presented in Appendix (Table A.3). There, we observe that few means show dramatic changes in both regions, moving from the pre-policy to the post-policy period. There are however a few important differences between the level of means across regions (for example, the percentage of immigrants in Quebec is much smaller than in the RofC).

5 Empirical strategy

In order to estimate long-run effects of the low-fee child care reform, we use a non-experimental evaluation framework based on multiple pre- and post-treatment periods. We have two groups (Quebec and the RofC) observed before and after the policy, wih only Quebec parents affected by the reform. The treatment group includes Quebec parents with children of a given age before and after the reform and the control group parents in the RofC with children of the same age observed for the same time period. [10] The Double-Differences estimator compares the evolution of the outcomes of treated before and after the policy with the outcomes of the untreated over the same period.

We use eight waves of the NLSCY (except wave 3 for parents with children 0 to 6 years and wave 4 for parents with children 7 to 9 years). Periods of pre-treatment and

10. The results are similar if we use Ontario's parents as the control group.

post-treatment differ according to the age of the child (Table 1). To account for the gradual implementation of the policy, we allow the effects of treatment to differ in each of the post-reform waves. The Double-Difference estimator is :

$$Y_{ij} = \alpha + \theta Q_{ij} + \sum_{j=1}^{8} \gamma_j D_j + \sum_{j=c}^{8} \beta_j W_j Q_{ij} + \Phi X_{ij} + \varepsilon_{ij} \tag{1}$$

where Y_{ij} represents a parent outcome for child i in wave j. The variable Q_{ij} is a dummy variable taking the value 1 if the child i lives in Quebec in wave j and 0 otherwise. A set of D_j wave dummy variables capture aggregate effects. To account for the progressive implementation of the policy according to the age group of children, a set of dummies W_j for each of the post-reform waves are interacted with Q_{ij} is included in the model. Variables W_j are dummy variables take the value of 1 if the wave is greater than or equal to $c = 4$ for families with children 1-6 and $c = 5$ for families with children 7-9 (see Table 1). The term X_{ij} is a vector of socioeconomic control variables and ε_{ij} is an iid error term. Standard errors are estimated using the 1,000 bootstrap weights provided by Statistics Canada. This procedure accounts for the complex survey design of the NLSCY.

Our empirical strategy relies on two critical assumptions. First, in the absence of the reform, outcomes of Quebec and RofC children would have followed a similar trend. We cannot observe untreated children in Quebec post-reform, but we can observe trends in the outcome variables in the treatment and control group prior to the reform. Figure 2 shows the evolution of a few outcome variables pre- and post-treatment. The shaded area is excluded from the analysis because of the phase-in of the program and the overlapping of treated and untreated. Prior to the reform, the trends are very similar.

Second, the existence of unobserved transitory shocks could be a concern. Indeed, a number of criticisms have been adressed to the Difference-in-Differences method (Bertrand, Duflo and Mullainathan, 2004 ; Donald and Lang, 2007), in particular because of a improper treatment of regional specific random shocks. Ignoring this problem can lead to an underestimation of the standard errors of the estimated parameters. While it is unlikely that there are unobserved transitory shocks affecting only Quebec parents' behavior and health and not the RofC (or vice versa), we choose to adjust the standard errors. Thus, we use a two-step procedure to correct standard errors (Donald and Lang, 2007). In the first step, we regress the outcome variables on the control variables X_{ij} and a set of dummy variables representing each province-wave-age of children interac-

tion,[11] while taking into account survey weights provided by Statistics Canada. For the second step, we regress the estimated coefficients of province-cycle-age interactions on a constant, time dummies, a Quebec dummy, and interaction terms $\sum_{j=c}^{8} \beta_j W_j Q_{ij}$. Each observation is weighted by the inverse of the variance of the estimated interaction term in the first step. We follow Haeck et al. (2015) and use the standard normal distribution for inference, as suggested by Wooldridge (2006) when the number of observations per group is high.

6 Results

We study three age groups separately : 1-5 years not in school, 5-6 years in school and 7-9 years.[12] This allows us to estimate the contemporary effect of the reform on parents with preschool children, but also the spillover effects into the school years.

We first focus on two-parent families. Then, we analyse the effects of the reform by maternal education, and finally for single-parent families. We felt important to analyse this group given their relevance for policy makers, despite the fact that other reforms targeting the latter were implemented during our survey period. In our opinion, the child care policy definetely outweighed by far the other reforms implemented during the period. For each estimate, we present the effects per wave $\beta_4 - \beta_8$ and the average effect over the entire post-reform period β_{4-8} (or β_{5-8}). For the unadjusted estimates, we report the coefficients, standard errors, and the significance level (indexed by $\star$). For reasons of clarity and space, for the adjusted estimates according the method of Donald and Lang (2007), we report only the level of significance of the results (indexed by †). The adjusted coefficients and standard errors are available from the authors upon request.[13]

11. For parents with children 1-5 years not in school, we have 350 dummies (10 provinces, 7 waves, 5 different age groups). For parents with children 5-6 in school, we have 120 dummies (10 provinces, 7 waves, 2 different ages). For parents with children 7-9 years, we have 150 dummies (10 provinces, 6 waves, 3 different ages).

12. To strengthen our findings, placebo tests were performed for all outcomes and age groups. For example, for 1-5 years not in school and 5-6 years in school, we used wave 1 as pre-reform and wave 2 as post-reform. For parents with children aged 7 to 9, several possibilities were tested for the periods pre- and post-reform. For all regressions, the estimated policy effects are not significant. The results are available on request.

13. Estimates from OLS and probit are very similar as well. However, to apply the method of Donald and Lang (2007), we must restrict ourselves to OLS results.

Estimated effects for two-parent families Table 2 presents the estimated effects of the low-fee child care policy on parents' health and behavior for those with children aged 1-5 years not in school. The results for parents with children aged 5-6 years in school and 7-9 years are presented in Table 3. We first discuss the results for parents with children 1-5 not in school and, subsequently, those of 5-6 and 7-9 children in school.

For parents with preschool children, we start with a model where policy effects do not vary by wave, under β_{4-8} (2000-2009). Unadjusted results (indexed by $\star$) show that the reform significantly increased the mother's depression score (significant effect of 0.70, 15 percent of a standard deviation). We also estimate a negative effect on positive interactions (significant effect of 0.62, 23 percent of a standard deviation) between the child and his/her parents as well as a positive effect on hostile and aversive parenting (significant effects of 0.69 and 0.34 respectively). These results are similar to BGM, despite adding three waves of data. When we let the policy effects vary by wave, we find that the effects are significant in almost all waves for these outcomes. These effects are large and remain so once we account for unobserved aggregate transitory shocks (indexed by †). However, the effects are smaller or insignificant in wave 8. An odd result concerns the family disfunction index, where we obtain a large positive significant result in cycle 8, albeit at a low level of confidence.

We also test to see if child care subsidies can cause changes in parental health and behavior when the policy is no longer contemporaneously effective, that is when all the parents' children are in school (Table 3). These are the first reported estimated effects of Quebec's low-fee child care policy for these age groups (5-6 and 7-9). The vast majority of the negative effects on parents, found in the preschool period, vanish once the child enters school. Positive interaction between the child and the parent is an exception. Indeed, the policy continues to have a negative effect on this outcome with or without correction of standard errors (significant effect of 0.64). We see a 4.6 percent decline in this score relative to the mean score of pre-reform period, corresponding to 25 percent of a standard deviation, which makes it very close to its value for the 1-5 year-olds not in school group. Interestingly, we note that for the positive interaction score, the effects are greatest for waves 5 and 6, which correspond to the sample where only children 5 years old in school are present in the sample (see Table 1). However, we observe no significant effects for wave 8.

For children aged 7-9 years old, the reform generally has no significant persistent effects on parents (Table 3). When we account for unobserved aggregate transitory shocks, the negative effects on positive interaction persist, but they are only significant

at a level of 10 percent and vanish when we let the policy effects vary by wave.

Estimated effects by maternal education In this section, we investigate whether the estimated effects differ according to maternal education. We divide our sample in two groups : (1) households with high-school educated mothers (low education) and (2) households with postsecondary educated mothers (high education). Table 4 and 5 present the estimated effects for parents with children aged 1 to 5 years old not in school and for parents with children aged 5 to 9 years old in school by maternal education, respectively.

For the case of low-educated parents with children 1-5 years not in school, the unadjusted results (indexed by $\star$) show that child care policy has a negative effect on several parental outcomes. We report an increase of the mothers' depression score (positive effect of 0.94) and several adverse effects on parents' behavior when effects do not vary by cycle. By analyzing the effects by wave, we observe that the effects of policy on parents' outcomes are significant throughout the post-reform period. These results are robust to the correction of standard deviations by the method of Donald and Lang (coefficients indexed by †). The pattern of the results are similar to those of the full sample. However, the effects are usually larger, which previews the results for mothers with a higher level of education, where the effects are smaller for children in this group. For high-educated families with children 1-5 years not in school, the reform has a positive effect on the mothers' depression score (positive effect of 0.60) when effects do not vary by wave. It also has a positive effect on hostile and aversive parenting and a negative effect on positive interactions between parents and child. Again, the effects are significant throughout the post-reform period when effects vary by wave. All significant effects remain as such after we correct for unobserved transitory shocks. As mentioned earlier, the effect sizes and significance levels of the effects are less important for this sample compared to the low education sample. For example, in the case of the mother's depression score, the effects are of the order of 13 percent of a standard deviation for mothers with a high level of education versus 21 percent of a standard deviation for mothers with a low level of education. Concerning aversive parenting, the effects are 20 percent of a standard deviation for mothers with a low education and 16 percent of standard deviation for those with high education.

In Table 5, for low-educated families, the majority of effects identified for preschoolers vanish at the beginning of the school (children 5-6) except for the positive interaction score (significant effect of 0.97). This is a 7 percent decline in positive in-

teractions relative to the mean or .34 of a standard deviation. The effect size for this outcome is higher than for the 1-5 group (34 percent versus 24 percent of a standard deviation for children not in school). For highly educated mothers with children 5-6 years in school, only the effect of the policy on the level of positive interactions remains significant when the policy effects do not vary by wave. The latter is of the same magnitude as that observed before beginning school (between 21 and 22 percent of a standard deviation in both cases). Again, we note that the reform has a greater effect on mothers with a low level of education compared to mothers with a high level. These results are robust to the correction of standard errors by the method of Donald and Lang.

Finally, for children 7-9 years, the effects of the reform on low-educated mothers are generally not significant. We observe some beneficial effects on maternal health and family dysfunction score, but they are relatively rare and are not robust to the two-step procedure accounting for unobserved transitory shocks (Table 5). Concerning high-educated mothers with children 7-9 years, the effects of the reform on parental outcomes are not significant for almost all outcomes studied. The results are generally robust to the correction of standard errors using the two-step procedure.

Estimated effects for single parents For single-mothers, it is clearly possible that other transfer policies may affect children. However, the results, we believe, are interesting given the relative importance of the child care policy relative to the other policies affecting single mothers. Table 6 presents the estimated effects for single parents with children aged 1 to 5 not in school. We also consider the effects of the reform for those with children aged 5 to 9 in school (Table 7).

Low-fee child care reform has a positive effect on mothers' depression score (positive effect of 1.60) for children aged 1 to 5 years not in school, when effects do not vary by wave (Table 6). We also see a decrease in positive interaction (negative effect of 0.77) and an increase in hostile and aversive parenting (positive effect of 1.03 and 0.82, respectively). Despite the fact that these mothers were possibly affected by other policies during this time period, it is interesting to observe that the estimated effects are qualitatively very similar to effects on two-parent families. These effects are more important in size than those of two-parent families. For example, the effects on the mothers' depression score and aversive parenting are respectively 26 percent and 39 percent of a standard deviation for lone families and 15 percent and 17 percent of a standard deviation for two-parent families. The effects are significant throughout the post-reform period studied. These results are robust to the correction of standard

deviations by the method of Donald and Lang.

For mothers with children aged 5-6 years in school, the policy has a positive effect on mothers' depression score and hostile parenting (indexed by $\star$) (Table 7). Significant effects are fewer than when the child wasn't in school. When we adjust the standard deviations, only the effect on mothers' depression score remains significant when effects do not vary by wave (indexed by †). Concerning mothers with children 7 to 9 years, the policy still increases hostile parenting and decreases positive interaction score. However, using the two-step procedure, the adverse effects on parental health and behaviors vanish (Table 7).

Discussion The aim of this study was to estimate the long-run effects of the Quebec's child care reform on parental health and parental practices. We build on the BGM study by adding a longer period of observation and follow-up beyond the age of 4 for the children of those parents. We first discuss the effects of the policy on parents with preschool children, then on those with children 5 to 9 in school, and, finally, present results for alternative samples.

We show that low-fee child care reform increased mothers' depression scores for mothers with children aged 1-5 years not in school. The policy also has a negative effect on parents' behavior with preschool children. These effects on parents are significant over the entire post-reform period. However, they are smaller or not significant in the last wave of the NLSCY. This last point suggests that the adaptation period to the policy is over. Unfortunately, wave 8 is the last wave of the NLSCY so that we cannot confirm this possibility.

The main contribution of our paper is that we estimate the effects of the reform on parents when children are in school. We show that the majority of adverse effects on parental outcomes, observed during the preschool period, vanishes at beginning of the school. For parents with children 5-6 years old, only a reduction of positive interactions is found. For those with a child 7-9 years old, the reform generally has no significant persistent effects on parenting and parental health. Thus, our results suggest that the impact of the policy is essentially contemporary, that is to say only lasts for the time when children are in child care and then vanishes with the beginning of the school.

We also report that the effects of the reform are larger for parents with a low education than for those with a higher education. Finally, we find very large negative effects on parenting and parental health for single mothers. Although other policies may be at work, these effects should be disturbing to the policy maker.

In a companion paper, Lebihan, Haeck and Merrigan (2015), show that the policy had negative effects on several measures of child well-being and behavior, but only during the pre-school period. However, these effects for the same outcomes as in pre-school vanish when the child enters school. There is therefore a symetry in the effects, negative effects on both parents and children when the child is in pre-school, but no or very little effect when he is in school. Therefore, the policy does not seem to produce long term negative effects, at least for the outcomes we analyzed in the paper.

The companion paper describes at length the difficulty policy makers had establishing high quality care in subsidized daycare services. There were efforts to increase the quality, but, as of now, the evidence that these efforts were successful is rather weak (Haeck et al., 2015). In fact, the evidence shows that the quality was definitely low on average in the first years of the program. Haeck et al. (2015) also show that the program dramatically increased the hours children spent in day care. Long hours in day care and low quality may have caused the negative effects on children, which in turn had a repercussion on parents. Finally, the positive effect of the policy on the labor supply of mothers with young children may have a direct effect on parents mental or physical health, independently of child outcomes.

There is no evidence of quality problems with schools in the province of Quebec. All teachers are well trained and this may reduce the problems that were created by the policy when the child is young.

7 Conclusion

Our paper shows that the Quebec child care policy had detrimental effects on parents when the child is of pre-school age, but very little once he is in school. Future research should try to establish why this is the case. However, lack of data on quality of care is a major stumbling block for such an endeavour. The negative effects of the policy on pre-school children and their parents should be of concern for policy makers in Quebec or for any policy seeking to provide universal care to children. The results are consistent with a policy approach that puts the quality of care, first, and the creation of subsidized spaces, second and the time spent on children. The early years for children and their parents are critical for families in many ways. Any major policy which seeks to radically increase the participation of mothers with young children through highly subsidized child care must thoroughly consider all family dimensions, in particular physical and

behavioral, before its implementation.

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Table 1 – Eligibility for low-fee child care by age of the child and NLSCY wave.

		Wave							
	Age	Wave 1 (1994-95)	Wave 2 (1996-97)	Wave 3 (1998-99)	Wave 4 (2000-01)	Wave 5 (2002-03)	Wave 6 (2004-05)	Wave 7 (2006-07)	Wave 8 (2008-09)
		Wave 1-5: Baker, Gruber and Milligan (2008)					Additional Data		
0-4 years: Baker, Gruber and Milligan (2008)	0	×	×	×	0.5	0.5	0.5	0.5	0.5
	1	×	×	×	0.5	1	1	1	1
	2	×	×	×	0.5	2	2	2	2
	3	×	×	0.5	1	2	3	3	3
	4	×	×	0.5	1	2	4	4	4
Additional Data	5	×	×	1	2	3	4	5	5
	6	×	×	×	1	2 (n.a)	3 (n.a)	5	5
	7	×	×	×	1	2 (n.a)	3 (n.a)	4	5
	8	×	×	×	×	1	2 (n.a)	3	5 (n.a)
	9	×	×	×	×	1	2 (n.a)	3	4 (n.a)

Notes : This table shows the eligible children in Quebec to the low-fee daycare reform (grey shaded area) and non-eligible children in Quebec (indicated by a symbol ×) according to child's age and wave. Numbers indicate the number of years of eligibility. For example, a 5-year child in wave 5 (and therefore born in 1997) was eligible for three years of low-fee child care. The index 0.5 refers to the fact that the child is eligible for a few months, not a year. We exclude wave 3 for children 0-6 years old and wave 4 for children 7-9 years old. The term n.a (not available) means that the child is eligible for low-fee child care spaces but data for this age group in this wave are not available in the NLSCY. Baker, Gruber and Milligan (2008) captured the short-term effects of the reform up to 2003. We extend the observation period to 2009.

Table 2 – Estimated effects of the policy on the health and behavior of parents with children aged 1 to 5 not in school (two-parent families)

	Children aged 1 to 5 not school							
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N
Parent Health								
Mother in	0.02	-0.01	-0.01	0.00	0.01	0.01	0.41	40,868
excellent health	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.49)	[350]
Father in	-0.01	-0.02	-0.02	0.04	0.03	0.01	0.45	40,642
excellent health	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.50)	[350]
Mother's depression	0.61*	0.57**	0.86**	1.25***	0.24	0.70***	4.05	39,892
score	(0.33)†††	(0.27)††	(0.36)††	(0.37)††	(0.31)	(0.24)†††	(4.59)	[350]
Parent Behavior								
Family Dysfunction	0.43	-0.40	0.13	0.01	0.64*	0.18	7.18	40,339
Index	(0.30)	(0.30)	(0.33)	(0.33)	(0.35)†	(0.24)†	(5.07)	[350]
Positive Interaction	-0.79***	-0.62***	-0.92***	-0.43**	-0.34*	-0.62***	15.89	30,127
(from 2 years)	(0.18)††	(0.17)††	(0.19)††	(0.18)†	(0.19)†	(0.14)†††	(2.74)	[280]
Hostile parenting	0.64***	0.69**	0.86***	0.89***	0.40	0.69***	8.33	29,657
(from 2 years)	(0.24)	(0.27)	(0.31)	(0.29)††	(0.28)	(0.21)†	(3.87)	[280]
Consistent parenting	-0.57***	-0.48**	-0.18	-0.06	0.05	-0.25	14.11	29,275
(from 2 years)	(0.22)	(0.22)†	(0.25)	(0.23)	(0.22)	(0.17)†	(3.27)	[280]
Aversive parenting	0.19	0.26*	0.51***	0.42***	0.36**	0.34***	8.29	29,985
(from 2 years)	(0.14)	(0.14)	(0.15)	(0.16)	(0.16)	(0.11)	(1.96)	[280]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β_{4-8}). Means and standard deviations (in parentheses) for each outcome before the policy change in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for two-parent families with children aged 1-5 not in school. Each regression includes all the control variables from Table A.3. Bootstrap weights from Statistic Canada are used for inference.

*** , ††† : significant at 1% ; ** , †† : significant at 5% ; * , † : significant at 10% ;

Table 3 – Estimated effects of the policy on the health and behavior of parents with children aged 5 to 9 years in school (two-parent families)

	Children aged 5 to 6 in school								Children aged 7 to 9					
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N	β_5 (2002-03)	β_7 (2006-07)	β_8 (2008-09)	β_{5-8} (2002-09)	Mean (S.d)	N
Parent Health														
Mother in	0.06	0.01	0.08	0.02	-0.01	0.03	0.39	15,489	-0.01	0.03	0.05	0.02	0.37	14,688
excellent health	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)	(0.04)	(0.49)	[119]	(0.05)	(0.04)	(0.06)	(0.03)	(0.48)	[150]
Father in	-0.04	-0.05	-0.13**	-0.04	-0.06	-0.06	0.47	15,412	-0.08	-0.04	-0.08	-0.06*	0.41	14,623
excellent health	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)	(0.04)	(0.50)	[119]	(0.05)	(0.04)	(0.06)	(0.03)	(0.49)	[150]
Mother's depression	0.06	0.29	0.17	0.26	0.09	0.15	3.70	15,236	-0.74*	0.10	-0.39	-0.28	4.15	14,499
score	(0.40)	(0.41)	(0.49)	(0.49)	(0.49)	(0.33)	(4.40)	[119]	(0.45)	(0.36)	(0.61)	(0.33)	(5.13)	[150]
Parent Behavior														
Family Dysfunction	-0.51	-0.18	-0.49	0.30	0.62	-0.03	7.27	15,327	-0.66	-0.09	-0.24	-0.32	7.64	14,531
Index	(0.47)	(0.49)	(0.65)	(0.54)	(0.59)	(0.39)	(5.12)	[119]	(0.52)	(0.37)	(0.60)	(0.34)	(5.25)	[150]
Positive Interaction	-0.62**	-0.90***	-0.88**	-0.77***	-0.31	-0.64***	13.90	15,537	-0.37	-0.21	-0.49	-0.31	12.22	14,723
(2 years or more)	(0.27)	(0.25)††	(0.33)	(0.25)†	(0.27)	(0.20)††	(2.59)	[119]	(0.27)	(0.22)	(0.33)	(0.20)†	(2.75)	[150]
Hostile parenting	0.05	0.31	0.41	0.39	0.53	0.31	8.54	15,364	0.02	-0.13	-0.10	-0.07	8.66	14,482
(2 years or more)	(0.40)	(0.42)	(0.55)	(0.47)	(0.46)	(0.38)	(3.74)	[119]	(0.36)	(0.30)	(0.52)	(0.27)	(3.73)	[150]
Consistent parenting	0.06	0.27	-0.03	0.78***	0.26	0.29	13.91	15,219	0.14	0.26	0.38	0.23	14.21	14,350
(2 years or more)	(0.28)	(0.27)	(0.37)	(0.29)††	(0.33)	(0.22)	(3.07)	[119]	(0.30)	(0.23)	(0.34)	(0.21)	(3.22)	[150]
Aversive parenting	-0.43**	0.12	0.04	0.03	0.01	-0.11	8.35	15,493	-0.40**	0.01	-0.24	-0.18	8.33	14,694
(2 years or more)	(0.18)	(0.18)	(0.26)	(0.21)	(0.19)	(0.15)	(1.83)	[119]	(0.18)	(0.14)	(0.24)	(0.13)	(1.70)	[150]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β_{4-8} and β_{5-8}). Means and standard deviations (in parentheses) for each outcome before the policy change in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for two-parents families with children aged 5-6 in school and 7-9. Each regression includes all the control variables from Table A.3. Bootstrap weights from Statistic Canada are used for inference.
*** , $\dagger\dagger\dagger$: significant at 1% ; ** , $\dagger\dagger$: significant at 5% ; * , $\dagger$: significant at 10% ;

Table 4 – Estimated effects of the policy on the health and behavior of parents with children aged 1 to 5 not in school by maternal education

Maternal Education: High school or less								
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N
Parent Health								
Mother in	-0.04	-0.08	-0.09	0.04	0.01	-0.04	0.37	11,161
excellent health	(0.06)	(0.06)	(0.05)	(0.06)	(0.07)	(0.04)	(0.48)	[341]
Father in	-0.08	-0.03	-0.11*	-0.05	-0.10	-0.07	0.43	11,095
excellent health	(0.06)††	(0.06)	(0.06)	(0.07)	(0.06)	(0.05)	(0.50)	[341]
Mother's depression	0.95	1.02*	1.01	0.70	0.92	0.94**	4.39	10,847
score	(0.75)	(0.58)	(0.70)	(0.61)	(0.60)	(0.44)	(4.50)	[341]
Parent Behavior								
Family Dysfunction	0.08	-0.78	-0.45	0.33	0.77	-0.08	8.21	10,979
index	(0.62)	(0.66)	(0.63)	(0.68)	(0.71)	(0.47)	(5.30)	[341]
Positive Interaction	-0.89***	-0.82***	-0.84**	-0.17	-0.25	-0.68***	15.72	8,302
(2 years or more)	(0.29)†	(0.31)†	-0,35	(0.36)	(0.40)	(0.24)†	(2.88)	[271]
Hostile parenting	0.74	0.40	1.40**	0.78	0.52	0.79*	8.15	8,159
(2 years or more)	(0.49)	(0.52)	(0.61)	(0.67)	(0.60)	(0.44)	(4.15)	[270]
Consistent parenting	-0.66	-0.72*	-0.74	-0.49	-1.09**	-0.74**	13.55	8,079
(2 years or more)	(0.41)	(0.41)†	(0.46)	(0.50)	(0.51)†	(0.31)	(3.27)	[270]
Aversive parenting	0.01	0.28	0.55**	0.65*	0.70**	0.38*	8.50	8,265
(2 years or more)	(0.26)	(0.26)	(0.26)†	(0.38)†	(0.35)	(0.20)	(1.92)	[271]
Maternal Education: Some post-secondary or more								
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N
Parent Health								
Mother in	0.04	0.02	0.02	0.01	0.02	0.02	0.42	29,707
excellent health	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.49)	[350]
Father in	0.02	-0.02	0.01	0.06*	0.06*	0.03	0.46	29,547
excellent health	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.50)	[350]
Mother's depression	0.45	0.40	0.78*	1.32***	0.06	0.60**	3.92	29,045
score	(0.28)†	(0.32)	(0.40)	(0.41)	(0.32)	(0.25)††	(4.62)	[350]
Parent Behavior								
Family Dysfunction	0.55	-0.24	0.36	0.04	0.68*	0.30	6.77	29,360
index	(0.34)	(0.37)	(0.40)	(0.41)	(0.40)	(0.29)	(4.91)	[350]
Positive Interaction	-0.75***	-0.54***	-0.99***	-0.46**	-0.36*	-0.60***	15.96	21,825
(2 years or more)	(0.21)†	(0.19)††	(0.22)††	(0.21)	(0.21)	(0.16)††	(2.68)	[280]
Hostile parenting	0.58**	0.82***	0.56*	0.90***	0.35	0.63**	8.40	21,498
(2 years or more)	(0.28)	(0.30)	(0.34)	(0.32)†	(0.33)	(0.25)	(3.76)	[280]
Consistent parenting	-0.52**	-0.38	0.09	0.08	0.35	-0.06	14.33	21,196
(2 years or more)	(0.25)	(0.26)	(0.27)	(0.25)	(0.26)	(0.20)	(3.24)	[280]
Aversive parenting	0.26*	0.26	0.46**	0.36**	0.27	0.32**	8.22	21,72
(2 years or more)	(0.15)	(0.17)	(0.18)	(0.18)	(0.19)	(0.13)	(1.97)	[280]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β_{4-8}). Means and standard deviations (in parentheses) for each outcome before the policy change in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for two-parent families with children aged 1-5 not in school by maternal education. Each regression includes all the control variables from Table A.3. Bootstrap weights from Statistic Canada are used for inference.
*** ††† : significant at 1% ; ** †† : significant at 5% ; * † : significant at 10% ;

Table 5 – Estimated effects of the policy on the health and behavior of parents with children 5-6 years old in school and 7-9 years old by maternal education

	Children aged 5 to 6 school								Children aged 7 to 9					
Maternal Education: High school or less														
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N	β_5 (2002-03)	β_7 (2006-07)	β_8 (2008-09)	β_{5-8} (2000-09)	Mean (S.d)	N
Parent Health														
Mother in	0.07	0.04	0.17	0.12	-0.05	0.07	0.32	4,240	0.04	0.04	0.23*	0.05	0.30	4,481
excellent health	(0.07)	(0.07)	(0.11)	(0.10)	(0.10)	(0.06)	(0.47)	[117]	(0.07)	(0.06)	(0.13)††	(0.05)	(0.46)	[150]
Father in	-0.01	-0.06	-0.18**	0.14	-0.04	-0.02	0.41	4,220	-0.04	0.03	0.10	0.01	0.39	4,461
excellent health	(0.07)	(0.08)	(0.08)††	(0.11)	(0.10)	(0.06)	(0.49)	[117]	(0.07)	(0.06)	(0.14)	(0.05)	(0.49)	[150]
Mother's depression	0.81	0.45	-1.29*	-0.17	0.00	0.16	4.12	4,166	-1.02	0.36	-2.29*	-0.49	4.63	4,423
score	(0.88)	(0.81)	(0.77)†	(1.08)	(0.89)	(0.62)	(4.51)	[117]	(0.86)	(0.68)	(1.35)	(0.62)	(5.71)	[150]
Parent Behavior														
Family Dysfunction	-0.82	-1.37*	-1.40	-0.49	1.05	-0.60	8.27	4,200	-2.41***	-0.60	-0.13	-1.37**	9.14	4,430
index	(0.77)	(0.78)	(1.00)	(1.13)	(1.10)	(0.62)	(5.30)	[117]	(0.91)†	(0.73)	(1.09)	(0.64)	(5.55)	[150]
Positive Interaction	-0.91**	-1.15***	-1.40**	-1.10**	-0.44	-0.97***	13.91	4,251	-0.67*	-0.37	0.31	-0.45	12.02	4,494
(2 years or more)	(0.42)††	(0.42)†	(0.55)	(0.49)††	(0.46)	(0.31)††	(2.84)	[117]	(0.37)	(0.36)	(0.55)	(0.30)	(2.88)	[150]
Hostile parenting	0.17	0.45	-0.18	0.87	1.12	0.45	7.99	4,192	-0.17	-0.22	-1.10	-0.27	8.67	4,424
(2 years or more)	(0.54)	(0.61)	(0.74)	(0.79)	(0.89)	(0.51)	(3.34)	[117]	(0.52)	(0.51)	(0.99)	(0.41)	(3.61)	[150]
Consistent parenting	-0.04	-0.15	0.58	0.29	0.37	0.16	13.28	4,172	-0.20	0.44	0.67	0.16	13.81	4,403
(2 years or more)	(0.49)	(0.50)	(0.66)	(0.72)	(0.68)	(0.41)	(3.08)	[117]	(0.46)	(0.42)	(0.79)	(0.36)	(3.18)	[150]
Aversive parenting	-0.92***	-0.12	0.12	0.03	-0.13	-0.36	8.63	4,236	-0.36	0.05	-0.35	-0.17	8.45	4,488
(2 years or more)	(0.35)††	(0.30)	(0.39)	(0.46)	(0.36)	(0.24)	(1.82)	[117]	(0.29)	(0.23)	(0.52)	(0.21)	(1.64)	[150]
Maternal Education: Some postsecondary or more														
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N	β_5 (2002-03)	β_7 (2006-07)	β_8 (2008-09)	β_{5-8} (2000-09)	Mean (S.d)	N
Parent Health														
Mother in	0.06	0.00	0.03	-0.02	-0.02	0.01	0.42	11,249	-0.02	0.03	0.02	0.01	0.42	10,207
excellent health	(0.06)	(0.06)	(0.08)	(0.06)	(0.07)	(0.05)	(0.49)	[119]	(0.06)	(0.05)	(0.07)	(0.04)	(0.49)	[150]
Father in	-0.05	-0.04	-0.10	-0.10	-0.06	-0.07	0.50	11,192	-0.07	-0.04	-0.11	-0.06	0.42	10,162
excellent health	(0.05)	(0.05)	(0.08)	(0.06)	(0.06)	(0.05)	(0.50)	[119]	(0.06)	(0.04)	(0.07)	(0.04)	(0.49)	[150]
Mother's depression	-0.29	0.24	0.84	0.41	0.20	0.17	3.50	11,107	-0.72	0.05	0.11	-0.19	3.84	10,076
score	(0.41)	(0.45)	(0.58)	(0.44)	(0.54)	(0.35)	(4.34)	[119]	(0.54)	(0.41)	(0.69)	(0.38)	(4.71)	[150]
Parent Behavior														
Family Dysfunction	-0.25	0.42	-0.02	0.69	0.76	0.33	6.77	11,127	0.35	0.33	0.04	0.29	6.69	10,101
index	(0.55)	(0.61)	(0.82)	(0.54)	(0.73)	(0.46)	(4.98)	[119]	(0.60)	(0.43)	(0.71)	(0.40)	(4.82)	[150]
Positive Interaction	-0.50*	-0.80***	-0.61	-0.65**	-0.26	-0.52**	13.89	11,286	-0.24	-0.13	-0.64*	-0.25	12.34	10,229
(2 years or more)	(0.29)	(0.30)†	(0.41)	(0.30)	(0.34)	(0.25)†	(2.47)	[119]	(0.37)	(0.26)	(0.38)††	(0.25)††	(2.65)	[150]
Hostile parenting	-0.03	0.26	0.67	0.19	0.31	0.21	8.85	11,172	0.04	-0.03	0.28	0.04	8.66	10,058
(2 years or more)	(0.55)	(0.53)	(0.70)	(0.57)	(0.59)	(0.51)	(3.92)	[119]	(0.48)	(0.36)	(0.58)	(0.34)	(3.80)	[150]
Consistent parenting	0.10	0.45	-0.26	0.96***	0.24	0.35	14.22	11,047	0.37	0.28	0.36	0.32	14.45	9,947
(2 years or more)	(0.36)	(0.34)	(0.49)	(0.36)††	(0.37)	(0.29)	(3.02)	[119]	(0.40)	(0.29)	(0.39)	(0.27)	(3.22)	[150]
Aversive parenting	-0.21	0.24	0.04	0.01	0.06	-0.01	8.22	11,257	-0.35*	0.01	-0.19	-0.15	8.26	10,206
(2 years or more)	(0.22)	(0.23)	(0.34)	(0.26)	(0.24)	(0.20)	(1.82)	[119]	(0.21)	(0.17)	(0.27)	(0.16)	(1.73)	[150]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β_{4-8} and β_{5-8}). Means and standard deviations (in parentheses) for each outcome before policy in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for two-parent families with children aged 5-6 in school and 7-9 by maternal education. Each regression includes all the control variables from Table A.3. Bootstrap weights from Statistic Canada are usedfor inference.
*** . ††† : significant at 1% ; ** . †† : significant at 5% ; ;* . † : significant at 10% ;

Table 6 – Estimated effects of the policy on the health and behavior of parents with children aged 1 to 5 not in school (single parents)

	Children aged 1 to 5 not school							
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N
Parent Health								
Mother in	0.02	0.02	-0.07	0.00	0.02	-0.00	0.31	6,779
excellent health	(0.06)	(0.07)	(0.07)	(0.08)	(0.08)	(0.05)	(0.46)	[331]
Mother's depression	1.18	1.08	2.27**	1.86	1.69*	1.60**	7.29	6,701
score	(0.91)	(1.30)	(0.99)†	(1.26)	(0.98)†	(0.76)†	(6.27)	[331]
Parent Behavior								
Family Dysfunction	0.28	0.64	0.58	0.97	1.30	0.73	9.22	6,424
Index	(0.77)	(0.86)	(0.81)	(0.86)	(0.98)	(0.64)†	(5.49)	[331]
Positive Interaction	-0.81**	-1.30***	-0.91	-0.23	-0.61	-0.77**	15.76	1,607
(from 2 years)	(0.38)	(0.45)††	(0.58)	(0.45)	(0.57)	(0.34)††	(2.82)	[261]
Hostile parenting	0.89	0.27	1.34	1.04	1.59**	1.03**	9.14	1,611
(from 2 years)	(0.58)	(0.70)	(0.85)	(0.80)	(0.72)	(0.49)	(3.96)	[261]
Consistent parenting	-0.67	0.00	-1.26*	0.33	-0.43	-0.45	13.17	5175
(from 2 years)	(0.52)	(0.52)	(0.71)	(0.57)	(0.74)	(0.45)	(3.41)	[261]
Aversive parenting	0.71**	0.44	0.84**	0.82**	1.29***	0.82***	8.52	5077
(from 2 years)	(0.33)	(0.38)	(0.41)	(0.41)	(0.42)	(0.27)	(2.12)	[261]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β_{4-8}). Means and standard deviations (in parentheses) for each outcome before the policy change in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for one-parent families with children aged 1-5 not in school. Each regression includes all the control variables from Table A.3. Bootstrap weights from Statistic Canada are used for inference.
*** . ††† : significant at 1% ; ** . †† : significant at 5% ; ;* . † : significant at 10% ;

Table 7 – Estimated effects of the policy on the health and behavior of parents with children aged 5-6 in school and 7-9 (single parents)

	Children aged 5 to 6 school								Children aged 7 to 9					
Variable	β_4 (2000-01)	β_5 (2002-03)	β_6 (2004-05)	β_7 (2006-07)	β_8 (2008-09)	β_{4-8} (2000-09)	Mean (S.d)	N	β_5 (2002-03)	β_7 (2006-07)	β_8 (2008-09)	β_{5-8} (2000-09)	Mean (S.d)	N
Parent Health														
Mother in	0.17*	0.16*	0.02	0.05	0.19*	0.13	0.25	2,991	0.02	0.02	-0.14	-0.01	0.33	2,975
excellent health	(0.10)	(0.10)	(0.14)	(0.12)	(0.11)	(0.08)	(0.44)	[116]	(0.09)†	(0.07)	(0.09)	(0.07)	(0.47)	[150]
Mother's depression	3.11**	1.60	4.42	2.94	1.74	2.76**	6.59	2,970	-0.78	-0.05	3.31*	0.19	6.55	2,958
score	(1.45)†	(1.47)	(2.97)†	(1.81)††	(1.93)	(1.13)†††	(5.49)	[116]	(1.35)	(0.98)	(1.93)	(0.98)	(6.67)	[150]
Parent Behavior														
Family Dysfunction	0.41	-0.02	-1.12	0.49	0.25	0.17	9.71	2,866	0.48	-1.42*	-0.26	-0.59	9.28	2,902
Index	(1.11)	(1.04)	(1.57)	(1.50)	(1.47)	(0.93)	(4.37)	[116]	(0.94)	(0.83)	(1.54)	(0.76)	(5.20)	[150]
Positive Interaction	0.25	-0.98	0.69	-0.52	-0.47	-0.19	13.60	3,012	-0.70	-0.34	-1.96***	-0.71**	12.34	2,972
(from 2 years)	(0.57)	(0.60)	(1.01)	(0.75)	(0.47)	(0.48)	(2.49)	[116]	(0.51)	(0.40)	(0.56)††	(0.36)	(2.89)	[150]
Hostile parenting	0.78	-0.13	1.67	1.09	1.76**	1.02*	8.82	2,971	1.57**	0.41	2.06*	1.06**	8.79	2,905
(from 2 years)	(0.77)	(0.67)	(1.07)	(1.07)	(0.78)	(0.58)	(2.93)	[116]	(0.76)	(0.56)	(1.23)	(0.52)	(3.33)	[150]
Consistent parenting	-0.14	-0.71	0.68	-0.87	-0.25	-0.33	14.26	2,940	0.26	0.05	-0.65	0.03	14.13	2,877
(from 2 years)	(0.77)	(0.72)	(1.23)	(0.92)	(0.80)	(0.67)	(3.79)	[116]	(0.74)	(0.47)	(0.75)	(0.44)	(3.25)	[150]
Aversive parenting	0.23	-0.39	-0.56	0.49	-0.15	0.06	8.90	3,005	0.21	-0.08	1.26**	0.22	8.11	2,969
(from 2 years)	(0.54)	(0.47)	(0.65)	(0.54)	(0.52)	(0.41)	(1.85)	[116]	(0.42)	(0.33)	(0.59)	(0.30)	(1.85)	[150]

Notes: This table shows the estimated coefficients and standard errors (in parentheses) for the unadjusted estimates (indexed by *). For the adjusted estimates, we report only the level of significance of the results obtained with the two-step procedure in Donald and Lang (2007) (indexed by †). The table also shows the effects by wave (β_4 to β_8) and the average effect for the post-treatment period (β). Means and standard deviations (in parentheses) for each outcome before the policy change in Quebec are included. The last column shows the number of observations for the unadjusted and adjusted estimated (brackets). Estimates are for parents with children aged 5-6 in school and 7-9 and single families. Each regression includes all the control variables from Table 4. Bootstrap weights from Statistic Canada are used for inference.
*** . ††† : significant at 1% ; ** . †† : significant at 5% ; ;* . † : significant at 10% ;

Table A.1 – Parent outcomes index component (Appendix)

Parent outcome Index	Questions	Types of questions
Family Dysfunction Index	Planning family activities is difficult because we misunderstand each other.	Strongly agree (1) to
	In times of crisis we can turn to each other for support	Strongly disagree (4)
	We cannot talk to each other about sadness we feel.	
	Individuals, in the family, are accepted for what they are.	
	We avoid discussing our fears or concerns.	
	We express feelings to each other.	
	There are lots of bad feelings in our family.	
	We feel accepted for what we are.	
	Making decisions is a problem for our family.	
	We are able to make decisions about how to solve problems.	
	We don't get along well together.	
	We confide in each other.	
Positive interaction	How often do you praise this child, by saying something like 'Good for you!'	Never (1) to
	or 'What a nice thing you did!' or 'That's good going!'?	many times each day (5)
	How often do you and this child talk or play with each other, focusing	
	attention on each other for five minutes or more, just for fun?	
	How often do you and this child laugh together?	
	How often do you do something special with this child that he enjoys?	
	How often do you play sports, hobbies or games with this child?	
Hostile/ineffective parenting	How often do you get annoyed with this child for saying or doing something he is not supposed to?	Never (1) to
	Of all the times that you talk to this child about his behaviour, what proportion is praise?	many times each day (5)
	Of all the times that you talk to this child about his behaviour, what proportion is disapproval?	
	How often do you get angry when you punish this child?	
	How often do you think that the kind of punishment you give this child depends on your mood?	
	How often do you feel you are having problems managing this child in general?	
	How often do you have to discipline this child repeatedly for the same thing?	
Consistency parenting	When you give this child a command, what proportion of the time do you make sure that he does it?	Never (1) to
	If you tell this child he will get punished if he doesn't stop doing something,	all the time (5)
	and he keeps doing it, how often will you punish him?	
	How often does this child get away with things that you feel should have been punished?	
	How often is this child able to get out of a punishment when he really sets his mind to it?	
	How often when you discipline this child, does he ignore the punishment?	
Aversive parenting	How often do you raise your voice, scold or yell at him, when the child breaks the rules?	Never (1) to
	How often do you calmly discuss the problem, when the child breaks the rules?	always (5)
	How often do you use physical punishment, when the child breaks the rules?	
	How often do you describe alternative ways of behaving that are acceptable,	
	when the child breaks the rules?	

Table A.2 – Dependant variable summary statistics by child age (two-parent families)

		Children aged 1 to 5 not school					Children aged 5 to 6 school					Children aged 7 to 9				
		Quebec		Rest of Canada			Quebec		Rest of Canada			Quebec		Rest of Canada		
		Pre	Post	Pre	Post		Pre	Post	Pre	Post		Pre	Post	Pre	Post	
Variable	Range	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.	Mean (S.d)	Mean (S.d)	Mean (S.d)	Mean (S.d)	Obs.
Parent Health																
Mother in excellent health	0-1	0.41 (0.49)	0.40 (0.49)	0.39 (0.49)	0.38 (0.48)	43,935	0.39 (0.49)	0.39 (0.49)	0.38 (0.48)	0.35 (0.48)	17,433	0.37 (0.48)	0.38 (0.48)	0.37 (0.48)	0.34 (0.47)	16,718
Father in excellent health	0-1	0.45 (0.50)	0.43 (0.49)	0.40 (0.49)	0.39 (0.49)	43,327	0.47 (0.50)	0.39 (0.49)	0.36 (0.48)	0.36 (0.48)	17,130	0.41 (0.49)	0.34 (0.48)	0.34 (0.47)	0.34 (0.47)	16,458
Mother's depression score	0-36	4.05 (4.59)	4.01 (4.81)	4.52 (4.97)	3.74 (4.44)	42,826	3.70 (4.40)	3.48 (4.66)	4.13 (4.69)	3.50 (4.46)	17,142	4.15 (5.13)	3.35 (4.45)	4.10 (5.07)	3.50 (4.55)	16,444
Parent Behavior																
Family Dysfunction Index	0-36	7.18 (5.07)	7.73 (5.11)	7.83 (5.14)	8.15 (5.04)	43,298	7.27 (5.12)	7.40 (5.08)	7.86 (5.10)	7.82 (5.08)	17,241	7.64 (5.25)	7.04 (4.96)	8.10 (4.94)	7.69 (5.04)	16,518
Positive Interaction (from 2 years)	0-20	15.89 (2.74)	15.72 (2.45)	15.89 (2.63)	16.35 (2.35)	32,841	13.90 (2.59)	13.94 (2.41)	13.73 (2.57)	14.47 (2.51)	17,609	12.22 (2.75)	12.63 (2.49)	12.33 (2.57)	13.03 (2.59)	16,825
Hostile/Ineffective parenting (from 2 years)	0-25	8.33 (3.87)	8.53 (3.31)	9.32 (3.72)	8.76 (3.39)	32,298	8.54 (3.74)	8.33 (3.26)	9.24 (3.72)	8.68 (3.36)	17,387	8.66 (3.73)	8.32 (3.28)	8.93 (3.80)	8.68 (3.60)	16,518
Consistent parenting (from 2 years)	0-20	14.11 (3.27)	14.67 (3.01)	14.71 (3.37)	15.55 (3.07)	31,883	13.91 (3.07)	14.87 (2.94)	15.14 (3.31)	15.80 (2.98)	17,221	14.21 (3.22)	14.98 (2.99)	15.47 (3.14)	15.98 (2.99)	16,302
Aversive parenting (from 2 years)	0-20	8.29 (1.96)	7.78 (1.94)	9.24 (2.23)	8.33 (2.10)	32,663	8.35 (1.83)	7.71 (1.81)	9.03 (2.06)	8.38 (2.01)	17,542	8.33 (1.70)	7.56 (1.70)	8.84 (1.91)	8.23 (1.94)	16,771

Notes: This table shows the range, number of observations, the mean and standard deviation (in parentheses) for each variable of interest for Quebec and the Rest of Canada before and after the reform. Each column represents an age category of child: 1-5 years no school, 5-6 years school and 7-9 years. Periods pre and post reform is based on Table 1. Descriptive statistics are for two-parent families and are weighted.

Table A.3 – Summary statistics for two-parent families with children aged 1-9

Variable	Child aged 1-9			
	Quebec		Rest of Canada	
	Pre-Policy	Post-Policy	Pre-Policy	Post-Policy
Child is a boy	0.51	0.51	0.51	0.51
Mother				
Less than high school	0.17	0.11	0.10	0.08
High school diploma	0.17	0.15	0.20	0.19
Some post-secondary	0.24	0.16	0.28	0.14
Post-secondary degree	0.42	0.57	0.42	0.59
Age 14-24 at birth	0.20	0.20	0.17	0.16
Age 25-29 at birth	0.42	0.38	0.37	0.32
Age 30-34 at birth	0.29	0.30	0.32	0.35
Age 35 or more at birth	0.09	0.12	0.14	0.18
Immigrant	0.08	0.10	0.19	0.21
Father				
Less than high school	0.19	0.15	0.14	0.10
High school diploma	0.17	0.19	0.19	0.21
Some post-secondary	0.21	0.16	0.23	0.13
Post-secondary degree	0.43	0.51	0.44	0.56
Age 14-24 at birth	0.08	0.09	0.07	0.07
Age 25-29 at birth	0.32	0.29	0.27	0.24
Age 30-34 at birth	0.39	0.36	0.38	0.37
Age 35 or more at birth	0.21	0.26	0.27	0.32
Immigrant	0.09	0.13	0.18	0.20
Family				
Rural Region	0.19	0.15	0.16	0.12
Region $<$ 30K	0.12	0.12	0.15	0.16
Region 30-99,999K	0.09	0.09	0.07	0.09
Region 100-499K.	0.08	0.06	0.22	0.19
Region $>$ 499K	0.52	0.58	0.39	0.44
None older sibling	0.47	0.47	0.41	0.43
One older sibling	0.36	0.38	0.37	0.39
At least two older siblings	0.17	0.16	0.22	0.19
None younger sibling	0.58	0.66	0.57	0.65
One younger sibling	0.34	0.29	0.34	0.30
At least two younger siblings	0.08	0.05	0.09	0.06
Same age siblings	0.03	0.02	0.02	0.03
N	4,387	8,577	19,367	47,128

Notes: This table shows the weighted summary statistics for children, mothers and fathers and families. The statistics are divided by Quebec and the Rest of Canada for the pre-reform and post-reform according to Table 1. This table includes all children 1-9 years from two-parent families. All statistics are percentages.

Paid Parental Leave: Leaner Might Be Better

Catherine Haeck, Philip Merrigan and Samuel Pare*

Abstract

In this paper, we study the impact of the Quebec Parental Insurance Plan on maternal monetary compensation while on leave and on the time spent outside the labour market during the child's first year of life. We find that mothers spent about 9.8 days more with their children following the implementation of the insurance plan and received a higher compensation. We then investigate the impact of the plan on child development. We find that the reform had no effects on cognitive and behavioral development, except for anxiety disorder. Using administrative data on health care costs and diagnostics from birth to age 7 years old, we find no effects of economic significance. These results suggests that while the overall costs of parental leave benefits in Quebec increased dramatically, the impacts on parental time investment and child well-being are modest.

Keywords: maternity leave reform, child development, family well-being, natural experiment

JEL Classification: J13, J18, J22, J24

* *Catherine Haeck:* Université du Québec à Montréal (haeck.catherine@uqam.ca). We gratefully acknowledge financial support from the FRQSC. We thank Pierre Lefebvre, Pierre-Carl Michaud, and the participants at SCSE and CEA conferences. We also want to thank the Quebec Inter-University Centre for Social Statistics (QICSS) for great support throughout this project. The analysis is based on Statistics Canada's National Longitudinal Survey of Children and Youth (NLSCY) restricted-access Micro Data Files available at the QICSS.

1 Introduction

Paid parental leave has evolved over the last decades in many countries. From modestly paid leave lasting a few weeks post birth, we now observe in many countries large-scale programs covering most mothers for several months. While countries struggle to cut down costs and raise revenues as the ratio of working age people per inhabitant decreases, evaluating the impact of large-scale government-run programs, such as paid parental leave, is quintessential.

In this paper, we provide a comprehensive evaluation of the Quebec Parental Insurance Program (QPIP). Although the program may seem complex at first, in practice, it mainly raised the benefits paid to mothers and fathers on leave during the child's first year of life. Our estimation strategy is based on the fact that the child's birth date, mother's place of residence and mother's working status determine eligibility. We use a differences-in-differences (DID) framework as well as a regression discontinuity approach using the birth as the threshold value. This paper is one of the first to evaluate a parental leave reform that mainly changed the compensation while on leave, on child development.

We first estimate the effect of the QPIP on parental benefits and time spent away from work to show the direct impact of the program on family resources in terms of time and money. We then estimate the effect of the program on child development. We use the National Longitudinal Survey of Children and Youth (NLSCY) and the Survey of Young Canadians (SYC) to measure the impact on family resources and children's cognitive and behavioral development. To measure the effect on child health, we use the Régie de l'assurance maladie du Québec (RAMQ) administrative medical records. All children in Quebec are covered by the provincial health plan. Our data set contains the entire medical history from birth to age 7 years old for a large, random sample of children born around the time of the reform. It includes both the physicians' actions and billing, as well as the diagnostics. We can therefore assess the effect on physicians health care costs, and the incidence and frequency of certain diseases. Finally, we discuss the distributive property of the program and evaluate the program's overall cost.

We find that the program raised parental benefits, but otherwise had no impact on time

away from work or child development and health. Our results suggest that the program mainly financed family leisure time and this was even more so for high-income families. It also raised the overall cost per dollar of benefits at the provincial level, but at the same time decreased the cost per dollar elsewhere in Canada.

The rest of the paper proceeds as follows. In Section 2, we provide a brief overview of the literature on parental leave reforms. Section 3 explains the QPIP in detail. We then discuss the data in Section 4 and lay out ou empirical strategy in Section 5. Section 6 presents estimates of the effect of the program on paid benefits, time away from work and child development. This section also includes a variety of robustness checks. We conclude in Section 7.

2 PARENTAL LEAVE REFORMS, WHAT IS THE EVIDENCE?

A growing body of research uses parental leave reforms to estimate the impact of parental time investment on children's outcomes. The major challenge faced by researchers estimating the causal effect of parental time investment on children's outcomes is the endogeneity of parental time investment. Children whose parent spend more time with them are likely to have more favorable family and home environment including better educated parents,[1] which contributes to their development beyond their parents' time investment. Paid parental leave reforms exogenously change the parental budget constraint and generally induce changes in parental time investment. They may however also have an impact family disposable income. This effect depends on the compensation received while on leave compared to the income after tax and child care deduction if working (e.g., Baker et al., 2010). To understand the impact of parental leave on children it is essential to first document the effect on both time and monetary resources. We do this in the next section, but first we provide a brief overview of the literature on parental leave and children's outcomes. A more detailed review is provided in Haeck (2015).

[1] See Guryan et al. (2008).

Research exploiting large changes in parental leave entitlements of a few months generally find positive effects on child development, with larger effects on specific subgroups of children. Carneiro et al. (2015) find a positive impact on the probability of completing high school (2.7 percent), with a larger effect on children of less educated mothers (5.2 percent). Danzer and Lavy (2013), Cools et al. (2011) and Liu and Skans (2010) find large positive effects in test scores for ages 15 through 16 years. However, the effects are generally larger for children of highly educated parents. Differences in the compensation rate and in the duration and timing of the effective treatment period (the age at which a child benefits from additional time with the parent) may explain these differences. More modest reforms of 6 weeks or less generally lead to no significant effects (e.g., Rasmussen, 2010; Dahl et al., 2013). But modest parental leave provisions in the first few months of life generally reduce infant mortality (Rossin, 2011; Tanaka, 2015). Longer leave, however, has stronger effects on postneonatal or child fatalities than for perinatal mortality, neonatal deaths, or low birth weight (Rhum, 2000).

Reforms studied in the literature extended the duration of paid leave and, in doing so, extended the time a parent can stay at home with his or her child while receiving a monetary compensation. In contrast, the reform studied in this paper only increased the compensation rate, not the number of weeks a parent can take a leave. In this sense, the reform is probably closer to the literature on the impact of financial resources on child outcomes. We return to this point in our discussion. Previous research on this reform found that the reform increased the participation of fathers in the household (Patnaik, 2015). We add to their contribution by estimating the overall impact of the reform on parental benefits while on leave and the labor supply of mothers in their child's first year of life. We also document the distributional effect of the reform by mothers' education level. Finally, we estimate the impact on children's well-being using a variety of cognitive and behavioral development outcomes as well as health.

3 THE QUEBEC PARENTAL INSURANCE PLAN (QPIP)

The QPIP was implemented on January 1, 2006. Discussions about a Quebec-specific plan had been ongoing in the province for over a decade, long before the Canadian federal plan was reformed in 2001. On March 1, 2005, Quebec and the Canadian government reached an agreement allowing the province to create its own insurance plan. Finally, on June 15, 2005 the plan was approved at the provincial level, too late for any parents to self-select into or out of the program. Prior to January 1, 2006, eligible parents could claim unemployment insurance through the Canadian federal employment insurance program while on parental leave. This program offered 15 weeks of maternity leave and 35 weeks of parental leave that could be shared by both parents. The income replacement rate was set at 55 percent with a maximum insurable income of $39,000 in 2006. As of 2006, parents residing in Quebec were now covered by the QPIP, which offered two options. Table 1 summarizes the federal plan and the two options of the QPIP.

Option 1 offers 18 weeks of maternity leave and 32 weeks of parental leave. The income replacement rate while on maternity leave is 70 percent. During parental leave, 7 weeks are compensated at a rate of 70 percent and the remaining 25 weeks are at a 55 percent rate. Option 2 offers 15 weeks of maternity leave and 25 weeks of parental leave, all covered at 75 percent. Both options 1 and 2 offer paternity leave: option 1 offers 5 weeks at 70 percent, and option 2 offers 3 weeks at 75 percent. Not only did the QPIP increase the replacement rate compared to the federal plan, but it also raised the maximum insurable income by 46 percent up to $57,000 in 2006. As a result, all parents in Quebec received a higher compensation while on leave, more so if their insurable income was above the federal threshold of $39,000. Clearly this program raised the disposable income of parents while on leave. The impact on parental time investment is less clear. Option 1 offers a total of 50 weeks of maternity and parental leave, exactly the same as the federal plan. Option 2 however offers only 40 weeks of maternity and parental leave.

Using publicly available administrative data from the QPIP administrative board, we can

estimate the gains from the QPIP versus those of the federal plan. The QPIP administrative data set contains aggregate yearly statistics on the number of recipients under each option by average weekly income and birth month. This allows us to simulate the impact on maternity and parental benefits for mothers. Figure 1 shows the overall average QPIP gain by eligible maternal weekly income. The figure shows that mothers earning no more than $750 per week gained less than mothers paid more than $750 per week on average, even in proportion to their weekly income. While compensation increased by about 11–13 percent for low-income mothers, it increased by 18 to 61 percent for mothers earning $850 to $1,250 (or more) respectively. This is not surprising given that the maximum insurable income increased under the QPIP.

The average gain for mothers taking the short versus the long option is calculated over 40 and 50 weeks respectively. About 21 percent of mothers choose the short option, and this number is very stable over the period. Because child care in Quebec is extremely inexpensive ($7 per day per child at the time of the reform) and the parental leave compensation may not be sufficient to support all of the family expenditures in the lower end of the income distribution, low-income mothers may have an incentive to return to work earlier. Figure 2 shows the fraction of mothers taking the short leave (40 weeks) by income categories. It shows that about 35 percent of mothers earning less than $300 per week choose the short option compared to 15 percent for mothers earning more than $900 per week.

Finally, the QPIP also included a specific leave period for fathers. Marshall (2008), using the Employment Insurance Coverage Survey, finds that a larger fraction of fathers in Quebec are on leave as of 2006: 56 percent in 2006 compared to 32 percent in 2005–however their average time on leave decreased from 13 to 7 weeks. In the Rest of Canada (RofC) the share of fathers taking leave remained stable at around 12 percent, but they increased their time at home from 11 to 17 weeks. Patnaik (2015) using the same data compares the trends in average time on leave for all fathers in Quebec versus those of the RofC. She finds that fathers in Quebec relative to fathers in the RofC increased their time on leave by 3 weeks on average. Figure 3 uses the QPIP administrative data. It shows that early in the program 59 percent of fathers took a leave, but the share increased rapidly to 79 percent in 2007 and

eventually reached 87 percent in 2013.Together these statistics suggest that a greater share of fathers in Quebec are on leave but possibly for a shorter period. Although the leave is short, 3 to 5 weeks, Cools et al. (2015) find that the introduction of a 4-week paternity leave in Norway in 1993 raised the percentage of fathers on leave and had a positive impact on the school performance of children.

Overall, the QPIP increased the compensation to all families while parents were on leave, but the compensation of high-income mothers increased proportionally more. First, the maximum insurable income was increased. Second, high-income mothers more often selected the long leave (50 weeks) than low-income mothers did. The QPIP also appears to have increased the participaction rate of fathers, which could also have an impact on the well-being of children. While these statistics are eloquent, they may not fully reflect the real changes caused by the QPIP. For example, it is possible that high-income mothers previously received a compensation from their employer such that the overall impact on their disposable income while on leave was in fact null. Using a number of data sources, we document as closely as possible the actual impact on children and their families by looking at the impact on the overall compensation of mothers and fathers, and also by using comparable families in the RofC to account for underlying common trends.

4 DATA SETS

We use four additional sources of data: (1) the National Longitudinal Survey of Children and Youth (NLSCY), (2) the Survey of Young Canadians (SYC), (3) the administrative records of the Régie de l'Assurance Maladie du Québec (RAMQ), and (4) the vital statistics administrative database.

First, to estimate the impact on parental benefits, we use the NLSCY. The NLSCY is a biennial survey of young Canadians. It was started in 1994 and ended in 2008. A number of outcomes can be studied using the NLSCY, including employment insurance benefits over the last 12 months and age of the child when the mother returned to work. When combined with the SYC–a cross-sectional survey conducted in 2010 using the NLSCY questionnaire–we

observe cognitive and behavioral development outcomes for children ages 2 through 4 years old whose parents were eligible for the QPIP. We also use our combined data set to look at the impact on child health and family functioning. In this data set, we observe children born between 2006 and 2008 ages 2 or 3 years old. For older children, we observe only one cohort of about 180 children postreform. These children were born in 2006 and we observe them at 4 years of age. Given the small sample size of treated older children, we focus on the well-being of children age 2 through 3 years old, but present the estimates for the 4-year-olds in the appendix. Effectively, we focus on children born three years prior to the reform and three years after, between 2003 and 2008 inclusively. We exclude children born prior to 2003, because their lives were affected by the highly documented Quebec child care reform. As of 2004, when children born in 2003 entered daycare, the network had stabilized and so had the labor force of mothers in Quebec (e.g. Haeck et al., 2015).

Table 2 shows the summary statistics for our main control variables. The age of the child postreform in both Quebec and the RofC is lower. This is due to the biennial design of the NLSCY. Our empirical strategy accounts for this age differences in three ways. First, we use age-standardized test scores when available. Second, we use a control group to control for trends over time, including those created by the NLSCY sampling design. Third, we always include age in months dummies in our regressions. Table 2 also shows that relative to children in the RofC, children in Quebec have fewer siblings and are slightly less likely to be premature and require hospitalization at birth. Mothers and fathers in Quebec are more educated than mothers and fathers in the RofC. The educational system in Quebec is different. In Quebec, high school finishes in grade 12 compared to grade 13 in the RofC. Students in Quebec then pursue two years of CEGEP (pre-university college) before entering university, while students in the RofC transition directly to university from high school. This explains the large differences in postsecondary education between the two regions.

Table 3 and 4 shows the summary statistics for our main outcome variables. The survey year indicates the year in which the survey started. Typically, the survey begins in the fall and ends in the spring of the following year. Table 3 focuses on parental outcomes when the

child age 0 through 1 year old. Questions on income from work and parental benefits[2] always refer to the past 12 months. Table 3 shows that mothers typically return to work when the child is slightly more than 10 months old, both in Quebec and the RofC. These statistics further suggest that mothers in Quebec spent slightly more time away from work in their child's first year of life, about 1.5 weeks ($p < 0.01$). Since mothers typically take slightly more than 10 months of leave and income-related questions refer to the past 12 months in the NLSCY, we restrict our sample to children less than 22 months old when we analyse the maternal income and parental benefits. From these statistics we can observe that mothers in Quebec typically earned a higher income from work[3] than mothers in the RofC. This reflects the higher participation rate of Quebec mothers in the labor market. To estimate the impact of the reform on the total amount of benefits received by the mothers, we adjust maternal benefits according to the age of the child at the time of the interview and the age of the child when the mother returned to work.[4] Table 3 shows that, prior to the reform, Quebec mothers also had slightly higher parental benefits and that this difference increased postreform. The difference-in-differences estimates presented in the last two columns of the table suggest that Quebec mothers received an average of $2,556 more following the introduction of the QPIP. This effect is large but not surprising since the main characteristic of the QPIP was to enhance paid parental benefits. When we estimate the impact on paternal outcomes, we restrict our attention to children under 15 months old since fathers are only eligible to a few weeks of paternity leave. Statistics presented in Table 3 suggest that fathers in Quebec received a higher income postreform and also claimed slightly higher benefits ($375). In sum, it appears that the reform mainly increased maternal compensation while on leave, but had little impact on the time the mothers spent away from work or on the compensation received by fathers.

[2]Paid parental benefits here refers to the part paid by the government through Employment Insurance.

[3]Income from work also includes employers paid parental leave benefits. As such, changes in employers benefits at the time of the reform would be captured through this variable.

[4]In practise total maternal benefits paid are estimated using the following equation:
$\left([a_i < 12]\,\frac{B_i}{a_i} + [a_i > 12]\,\frac{B_i}{(12-(a_i-12))}\right)\max(d_i, 12)$
where a_i is the age of the child in months at the time of the interview, B_i is the amount of benefits claimed over the past 12 months, and d_i is the age of the child in months when the mother returned to work. We also used 9 months of benefits as opposed to 12, and obtained slightly smaller estimates of the impact of the reform on paid parental leave.

In our data set, we observe a number of outcome measures for children ages 2 and 3 years old. We have at our disposal one parent-reported measure of cognitive development and six parent-reported measures of behavioral development. The Motor and Social Development (MSD) scale measures early child development and uses a variety of questions used in leading measures of child development (Denver Prescreening Developmental Questionnaire, Bayley Scales of Infant Development and Gesell Development Schedules). It was developed by the National Center for Health Statistics (United States Department of Health and Human Services) and has been used in other surveys such as the National Longitudinal Survey of Youth, in the United States, and the National Child Development Survey, in the United Kingdom. A higher MSD score indicates a better motor and social development. The behavioral scales measure emotional disorder, inattention, hyperactivity, physical aggression, opposition and separation anxiety. A higher score implies further evidence of behavioral disorder across all six measures. These measures come in part from the Achenbach's Child Behaviour checklist (CBCL) and the Ontario Child Health Study (OCHS).

Since an adverse family environment is detrimental to child development–and the reform was explicitly designed to help families not just children–we also estimate the impact of the reform on two measures of family environment when the child is 2 and 3 years old. The family functioning scale and the social support scale are based on a series of questions from the Robert Weiss's Social Provisions Model and the McMaster Family Assessment Device (FAD). The FAD has been translated into seven languages and has been used in numerous studies

Finally, given the potential effect on health, we also estimate the impact on two parent-reported measures of health: a general assessment of the child's health (excellent to poor, five levels), and the frequency at which the child has been in good health in the past few months (almost all the time to almost never, five levels).

The summary statistics for these outcome measures are presented in Table 4. For the cognitive measures, we find that Quebec children score slightly below children in the RofC. Postreform, Quebec children do not improve their score relative to children in the RofC. Similar conclusions emerge when we look at the behavioral scales.

In these surveys, child health is measured by the parent. To validate our results we also use the RAMQ data. This data set contains every physician invoice within the public system. In Quebec, practically all physicians (generalists and specialists) practice medicine in the public system. Health care is mostly free at the point of use, since the billing and claims to the government for health care costs are handled by doctors, hospitals and clinics. This is fairly unique in the world, even compared to European countries where patients typically have to assume a small share of the costs, and in some cases have to pay the total amount upfront and get reimbursed later through public insurance. In Quebec, the RAMQ is the sole public agency authorized by the government to pay for services provided by physicians participating in the system (practically all of them). Every transaction in the data set includes the following details: intervention date, fee, diagnostic[5] (e.g., pneumonia, osteitis), type of facility (e.g., hospital, walk-in clinic), type of physician (specialist or generalist), area of expertise (e.g., pediatrics, oncology), patient's social assistance status, patient gender and region. We have information on over 17,819 newborns–8,599 born three months before the reform and 9,220 born three months afters–from birth to age 7 years old. In total we have over 1 million records for these children. We also have information on whether or not the mother was on social assistance at the time of birth. Mothers on social assistance are not eligible for paid parental leave. Children of mothers not eligible for paid parental leave allow us to control for seasonality. Using the RAMQ data, we can estimate the impact of the program on child health care costs between ages 0 and 7 years old.

Finally, we use the vital statistics to verify that children born around the discontinuity point do not differ in any observable ways. This data set includes all children born in Quebec and provides information on both the mother and the child. Maternal variables include the number of years of education, marital status, language spoken at home, country of birth, and area of residence. Child specific variables include the birth weight, gestation length, gender, multiple birth indicator, birth order and birth date.

Together, these data sets allow us to estimate the impact of the reform on a variety of dimensions. First, we can assess the financial impact while on leave and the impact

[5]Note that for routine exams no diagnostics are provided.

on maternal time investment. These estimates are crucial since they determine the actual treatment resulting from the QPIP. Second, we can estimate the impact on children's well-being from birth to age 7 years old. The focus of this paper is on family resources while on leave and children's well-being. Other outcomes that the reform possibly has an impact on and that have not yet been studied, such as fertility and maternal labor supply over the long run are left for future studies.

5 EMPIRICAL STRATEGY

Our econometric approach is based on a DID estimator and a regression discontinuity design (RDD). When studying maternal compensation and weeks away from work as well as child outcomes using the NLSCY and SYC, we use a DID approach. For these outcomes, RDD is not an option because we have an insufficient number of children born around the policy cutoff. In this case, we use a longer period and use parents and children from the other Canadian provinces as a control group. The DID estimating equation is as follows:

$$y_{i,by+t} = \alpha + \theta I(by \geqslant 2006) + \gamma T_{i,by} + \beta T_{i,by} I(by \geqslant 2006) + \varepsilon_{i,by+t} \tag{1}$$

where by is the birth year of infant i and t is the number of years between the birth of the child and the interview at age 4 or 5 years old. $I(by \geqslant 2006)$ is an indicator function equal to one if the child was born after the policy change and zero otherwise. $T_{i,by}$ is the treatment status of the mother and is equal to one if the mother worked prior to birth (prior to and post reform) and equal to zero otherwise. $\varepsilon_{i,by+t}$ is an error term. The estimated effect of the policy reform is β. The DID estimator can be consistently estimated using OLS under the following assumptions: (1) common trend, and (2) no selection on transitory shocks. Assumption (1) implies that the trend in the treatment group (Quebec) follows that of the control group (RofC). Under assumption (2), the DID estimator is consistent even in the presence of selection on unobservable individual fixed effects. More explicitly, mothers and children from Quebec may have permanent differences when compared with mothers in the

RofC and these differences can influence the outcome variables.

When we turn to health care costs and diagnostics using RAMQ data, we use RDD. In the RAMQ data, we observe 18,000 children born within three months of the policy change (before or after). This represents about 40 percent of all children. The empirical model is as follows:

$$y_{i,by+t} = \alpha + \theta I(by \geqslant 2006) + \varepsilon_{i,by+t}. \tag{2}$$

In the RAMQ data, we have all health care transactions over a seven-year period for the sample of children born around January 1, 2006. We also have all the transactions for a comparable sample of children whose mothers were not eligible to paid parental leave. These children allow us to control for seasonality. For example, children conceived in May are more likely to be prematured. These babies are generally delivered in January and February which coincides with a higher influenza prevalence (e.g., Currie and Schwandt, 2013).

Because we do not specifically identify treated mothers and children residing in Quebec, our estimates measure the intention-to-treat (ITT) of the program. In other words, they report the average effect of the program across all mothers and children in Quebec as opposed to the specific effect of the program on mothers and children benefiting directly from the QPIP. To recover treatment-on-the-treated (TOT) effects, the estimated impacts need to be multiplied by a factor of 1.25, which is the inverse of the percentage of mothers receiving QPIP benefits during our observation period.

6 ESTIMATED INTENTION-TO-TREAT (ITT) EFFECTS OF THE REFORM

First, we document the impact of the reform on parental benefits and time investment. This allows us to determine the actual treatment induced by the reform and to get a clearer picture of the underlying mechanisms Second, we estimate the impact of the reform on children's well-being.

6.1 Benefits and Time

The impact of the QPIP reform on parental time investment is not a priori clear. On the one hand it increases paid benefits while on leave, which reduces the opportunity cost of not working and could entice parents to take more time off work. On the other hand, it offers a short option (40 weeks versus 50) that basically offers almost the same total amount of benefits paid and could therefore reduce the time parents invest in their children postreform. Clearly, because the amount of insurable income was raised, mothers with an income above the prereform threshold saw their opportunity cost of not working decrease proportionally more than did mothers below the threshold. They are more likely, therefore, to increase their time away from work.

Table 5 below shows the estimates (β) on parental income from work and leave benefits, and on time away from work for the mother.[6] We show the results for our base model (equation 1) in specification (1). Specifications (2) through (4) additionally include a set of control variables defined at the bottom of Table 5. Child and family characteristics include the child's gender, number of siblings, single parent status, maternal education, paternal education, maternal age at first child, maternal age at birth, and maternal immigrant status. Infant health characteristics include birth weight, gestation, multiple birth dummy, postnatal care dummy and breastfeeding dummy. Together these specifications suggest that following the reform maternal income from work decreased by as much as $1,558 while maternal benefits increased by $2,729. The TOT effects would then be a decrease in income from work of $1,948 and an increase in benefits of $3,411 for mothers benefiting from the QPIP. Maternal income may have decreased for two reasons: mothers returned to work later than they did prior to the reform or employers reduced the benefits paid to mothers on leave. Our data suggests that mothers returned to work 1.4 weeks[7] (0.33 months) later postreform which represents a loss of income of about $880.[8] While the work behavior of mothers explains part of the variation, it does not fully explain the loss of income. The remaining part

[6] Time away from work is not available in the NLSCY for the father.

[7] The TOT effect would be 1,8 weeks.

[8] Administrative records from the QPIP shows that the average weekly income for benefit recipient mothers was $616 in 2006.

most likely reflects a reduction in the parental benefits paid by employers in response to the increase by the government. To confirm the robustness of our results, we use parental outcomes for children born in Canada's largest province, Ontario (specification 5). We selected Ontario because outcomes in Quebec and Ontario share similar trends. We also restrict our observation period to two years pre- and postreform (specification 6). While the benefits and time spent away from work remain comparable in both cases, the impact on maternal income is somewhat smaller in specification 5 and not different from 0 in specification 6. We conclude, threfore, that postreform mothers in Quebec received approximately $2,700 of additional benefits on average, spent from 1 to 1.4 weeks more with their infants, and saw a reduction of a maximum of $1,558 in income from work, because of the reform.

A fairly large literature studies the link between breastfeeding and child health (e.g., American Academy of Pediatrics (1997)). Since mothers spend slightly more time with their infant postreform, one might wonder if this resulted in a longer breastfeeding period. Our results do suggest a modest increase in breastfeeding duration of about 1.1 week.

Finally, the QPIP also had a component exclusive to the fathers. Because fathers typically take only a few weeks of leave and the questions in the NLSCY refer to the past 12 months, our estimates on fathers are performed on fathers with children under 15 months old. We find some evidence of fathers taking up parental leave. Their benefits increased by $466 postreform and their income from work remained constant (+$256 but not different from zero).

When we look at the differential impact for mothers having a college or university degree (High Educ) versus all others (Low Educ), we find that highly educated mothers reacted more to the reform. Compared to low-educated mothers, highly educated mothers spent 2.8 weeks more with their child and received an additional $2,133 in benefits.

In sum, our results suggest that mothers spent slightly more time with their child (<= 1.4 weeks), which was mirrored by a comparable increase in breastfeeding duration, and these effects appear to be driven mainly by highly educated mothers. Fathers benefits suggest that fathers also spent slightly more time with their child, but the increase is likely less than 3 weeks on average. The overall gains to the families are positive, but modest when the overall

loss of income from work is accounted for.

6.2 Children's Well-being

The reform we study is modest in terms of its average impact on parental time investment and family income, but its impact on families with highly educated mothers is slightly larger. In this section, to estimate the impact of the reform on children's well-being, we compare the outcomes of children ages 2 to 3 years old in Quebec before and after the reform to the outcomes of comparable children in the RoC. Generally, our results do not suggest that the reform benefited young children in Quebec in several dimensions. The impact on the MSD score is positive (about 0.06 SD) but not always significant. It is larger for children of mothers with a college or university degree (High Educ), but again not significant. We find that the reform appears to have decreased the presence of emotional disorder and anxiety (about 0.11 SD) and also slightly decreased the presence of separation anxiety (0.03 SD). We do not find any persistent and significant effects on hyperactivity and physical aggression, but the signs generally suggest a reduction of behavioral problems. The impact on behavioral development of children of highly educated mothers generally points to an improvement, but the effect is only significant for emotional disorder and anxiety. For children of low-educated mothers, the results are mixed and do not suggest an overall improvement. Finally, when we look at health outcomes, we find that child health appears to have benefited (about 0.04 SD), and this especially holds for children of highly educated mothers.

But what do these changes represent? On emotional disorder, if 15 mothers out of 100 changed their answer by one category to one of the 5 questions included in the emotional scale this would generate an impact of -0.15. For example, mothers could answer 1 (never) as opposed to 2 (sometimes) to the question "How often would you say that this child cries a lot?" For the MSD score, if 19 mothers out of 100 changed their answer to one of the 15 MSD questions we would measure an impact of the order of 0.97. For example, they could answer 1 (yes) as opposed to 0 (no) to the question "Has he ever walked up stairs by himself without holding on to a rail?" or to the question "Has he ever spoken a partial sentence of

3 words or more?" Finally, regarding child health, the effect we document (-0.03) could be generated by 3 mothers out of 100 now reporting that their child's health improved by one category (e.g., from 2 [good] to 1 [excellent]). In sum, the effects measured are modest and generally not significant.

The outcomes we used above were reported by the parents. To further grasp the importance of the effects we measured on child health, we now use data on health care costs. This allows us to document whether or not the positive impact on child health at ages 2 to 3 years old translates into lower health care costs. Furthermore, because we observe healthcare costs over the first seven years of life, we can identify when the impact (if any) appears. In practice, the administrative records of the RAMQ at our disposal include all medical billings by physicians for 18,000 children born around January 1, 2006 from birth to age 7. Before we present our RDD estimates, we validate that children pre and postreform can be considered to be randomly assigned around the discontinuity point. This assumption is crucial to our identification. The RAMQ data does not provide a good set of child and family characteristics. Instead we use the Birth Registry database, which includes all births in Quebec and therefore accurately represents the population of newborns in Quebec. Figure 4 shows the child and family characteristics at the moment of birth, over time. Clearly, there is no sharp discontinuity in child and family characteristics as of 2006. Birth weight and gestation exhibit some seasonality patterns. We account for seasonality using a control group of children whose parents were not eligible for the reform.

Table 7 shows our estimated impacts using RDD and DID with controls (region and gender). We first focus on the row *All* that reports the RDDx results for our entire sample. We find that children born postreform have lower health care costs in the first six months of life but this reverses in the following six months of life. This likely reflects a seasonality effect with prereform children experiencing most of the winter in their first six months of life while postreform children experience winter mainly before turning one year old. When we look at the overall cost before pre- and postreform children turn 2 years old, we see that the cost difference between the two groups is almost null, at $6.60. By the time postreform children reach 7 years old, they have lower health care costs, but the difference is small and

not significant at -$14.23.

Children whose parents were on social assistance at the time of birth were not eligible for the QPIP. When we exclude those children, we find that the difference once children reach 7 years old is even smaller, at -$2.61. Surprisingly, the difference for children of parents not eligible for the parental leave reform (*Assisted*) is large at -$138.37, but not significant. About 50 percent of the difference is already present at ages 0 to 5 months old (p-value<0.05). This may reflect seasonal effects, with children born between January and March being generally less sick than children born at the start of the winter between October and December. If we correct our RDDx estimates for seasonal effects measured using children of parents on social assistance, we find that the overall impact after 7 years suggest an increase in health care costs postreform of the order of $138.93. This effect is not significant however.

Health care costs have a skewed distribution. Most children have small health care costs over the first seven years of their life and only a few exceptions have relatively high health care costs. These extreme values may not be evenly distributed around the discontinuity point. When we exclude the top 1 percent and the top 2.5 percent (see Table A.2), we find similar patterns, but the estimates are slightly more precise and of smaller magnitude. The DIDx estimates remain significant up to age 3 years old at $68.92 (p-value>0.1). One possible explanation is that parents follow the regular check-up calendar recommended by doctors in Quebec better. This would result in a slight increase in overall costs without reflecting a worsening of child health. Using time-diary data from Statistics Canada's General Social Survey (GSS), Patnaik (2015) finds that fathers are more actively involved postreform in Quebec. More specifically, she finds that fathers exposed to the reform spent more time in nonmarket work (the sum of non-market work and child care) and these effects were long lasting. As such, although mothers return to work only 1.5 weeks later on average, fathers now get more involved through paternity leave, and this additional involvement may allow the parents to better organise themselves as a family.

7 DISCUSSION

Why should children benefit from the QPIP? There are multiple channels by which children may be affected including, but not limited to, the following: (1) more time spent with the parent may lead to the formation of a more secure attachment, (2) increased breastfeeding duration may improve child health, (3) increased paternal involvement may improve family functioning, and (4) changes in disposable income may contribute to child development.

First, theories in psychology and recent empirical evidence in neurosciences suggest that increasing the time spent with the mother allows the formation of a more secure attachment (Bowlby, 1958; Bell and Ainsworth, 1972; Ainsworth et al., 1978; Schore, 1994, 2001) and this is especially true at around 8 months old (Schaffer and Emerson, 1964). According to Bowlby, the failure to develop attachment (with the mother or her replacement) may be linked with delinquency, depression, increased aggression and reduced cognitive skills. In our setting, the impact on parental time investment is very modest with highly educated mothers spending about 2.8 weeks more with their child and all other mothers spending no more additional time. Such a modest impact is unlikely to yield major positive impacts on child development.

Second, the literature on breastfeeding duration suggests that increasing breastfeeding at least until the child is 6 months old should result in improved child health (e.g. Turck (2005), Ortega-Garcia et al. (2008)). In the QPIP context, the gains in terms of breastfeeding duration take place within the critical six months window (see Table 5). While the gains are largely significant, they are extremely modest (about 10 additional days) and only positive and significant for highly educated mothers. Overall, the modest impact on breastfeeding does not translate, however, into lower health care costs over the first seven years of life of the child. Compared to previous studies on parental leave and child health cited above our results may appear surprising. These studies looked at the impact of parental leave duration on health measures at the time of birth and post-neonatal and child fatalities. In contrast, we study a reform that barely changed parental time investment but had a positive impact on the disposable income of parents while on leave.

Third, there are limited studies on the role of fathers during the child's first year of life. This is mainly due to the fact that although many countries offer a few days of paternity leave immediately following childbirth, few countries actually have dedicated paternity leaves that do not overlap with that of the mother. In 2013, three countries offered more than 16 days of paternity leave: Slovenia, Iceland and Sweden. Del Carmen Huerta et al. (2013), using data on four countries (Australia, Denmark, the United Kingdom and the United States), found that fathers taking leave immediately after childbirth are more likely to be involved with their young children. Patnaik (2015), cited above, exploited the QPIP reform and found that fathers in Quebec are more actively involved postreform but observes fewer than 100 fathers postreform. In Sweden, Liu and Skans (2002) found that paternity leave improves school readiness, especially for girls. While the role of fathers is not yet well understood early evidence using quasi-experimental framework suggest that their participation leads to positive outcomes. It is possible that the modest positive impacts we uncover on child behavior may be due to the higher involvement of fathers postreform.

Finally, changes in disposable income allow parents to further invest in their child in terms both of time and of commodities that could improve their child's development. Almond and Currie (2011) review the existing evidence on the impact of cash transfers on child development and conclude that it is mainly positive. Compared to cash transfers that target low-income households, the QPIP mainly benefited families who typically have a higher income to start with. We find large impacts on parental compensation for highly educated mothers that appears to translate to slightly better outcomes for children.

The main limit of our study is that we are unable to identify the exact mechanisms by which children of highly educated mothers benefited from the reform. It may be the combination of all inputs, or one input in particular that helped them achieved better health and behavioral outcomes. This is often the case in the literature on parental leave reforms since both the time and resources of the families change at the same time. Clearly, in our setting, the impacts on time investments are extremely modest while the impacts on financial resources are more substantial, at least for maternal benefits. It is tempting to attribute our findings to the additional compensation, but that remains to be proven.

Irrespective of the mechanisms, one might wonder if the benefits are worth the costs. When Quebec decided to opt out of the federal parental leave program, an agreement was reached whereby the unemployment insurance premium of Quebec residents would be permanently reduced by about 0.34 percent. In turn, to finance its program, the province of Quebec implemented an income tax on insurable income of 1.34 percent for salaried employees and 0.99 percent for the self-employed. We estimate that the additional cost to the province of Quebec of running its separate parental leave program was about $1.4 billion in 2013.[9] Part of this can be attributed to the higher amount of benefits paid to parents, but also to the difference between the rebate received by the federal government and the actual cost of the program previously run by the federal government. In practise, the rebate received from the federal government does not fully cover the former cost of the federal program.

Mothers in Quebec prior to the reform were already investing a large fraction of their time at home during their child's first year of life. The additional compensation did not really contribute to improving this investment and mainly benefited families with higher income. It is hard to imagine that the modest impact we uncover is worth these additional costs that do not even account for the fiscal cost of raising the amount needed to run the QPIP. In Quebec, recent estimates suggest that it cost around $0.72 to raise $1 through income taxation (Quebec government, 2015). Finally, the QPIP program is not redistributive in nature. We observe that mothers earning higher income benefit more from the program both in terms of the compensation they received and the amount of time they can therefore invest in their children. Raising the equity of the program should be a governmental priority.

In sum, not only is the program expensive, it also mainly benefits families who were generally better off to start with. The design of the program enticed families with highly educated mothers to further invest in their child, while it had virtually no impacts on all other families. In line with these results, we find that children of highly educated mothers benefited from the reform, while others did not. Clearly, the QPIP could be redesigned to

[9] In 2013, the province collected $1.976 billion for the parental leave program and received at best a rebate on its unemployment premium of $0.510 billion from the federal government.

provide more equal opportunities for families to invest in their children. The role of fathers in the family could also be strengthened by dedicating a fraction of the existing parental leave to fathers instead of adding father-specific weeks that can be taken while the mother is also on leave. Finally, given the costs and benefits[10] of the program reducing the QPIP income tax and the overall compensation to higher income-families would improve the effectiveness of the program,

8 CONCLUSION

In this paper we evaluate the impact of the QPIP on parental benefits and time investment, as well as on children's well-being–measured using a variety of outcomes and data sources. We find that treated mothers spent slightly more time with their child (<= 1.8 weeks), and this additional time was mirrored by a comparable increase in breastfeeding duration. Fathers' benefits suggest that fathers also spent slightly more time with their child, but the increase is likely less than three weeks on average. The overall gains in disposable income while on leave are positive but modest when the overall loss of income from work is accounted for. The effects on children's health, behavior and cognitive development are generally positive but small and not significant. Most of the effects we uncover are driven by highly educated mothers and their children.

The program is not generally redistributive in nature. Changes induced by the QPIP mainly benefited higher income families. While the province benefited from a rebate on unemployment premiums from the federal government, the rebate does not fully cover the former cost of the program. These additional costs combined with the more generous benefits paid under the QPIP, led the province of Quebec to implement an additional tax on income. Taking into account the fact that raising additional revenues from income taxation has a cost, that the program is not redistributive in nature and that the benefits of the program in terms both of maternal time investment and children's well-being are limited, we find that raising compensation past a certain threshold is both countereffective and inequitable.

[10] Other benefits not documented here might include better retention of women in the labor market and increased overall well-being.

These findings have important implications for other jurisdictions offering paid parental leave or planning to do so. Our results suggest that income need not be fully replaced for parents to invest time with their children, especially for highly educated and most likely high-earning parents. Increasing both the replacement rate from 55 percent to about 70 percent and the amount of insurable income barely had an impact on the maternal time investment decision. On a more positive note, the program did increase paternal time investment. It thus appears that dedicating time to the father increases the participation of fathers in rearing their children.

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10 FIGURES

Figure 1: Average QPIP gains over the entire leave period

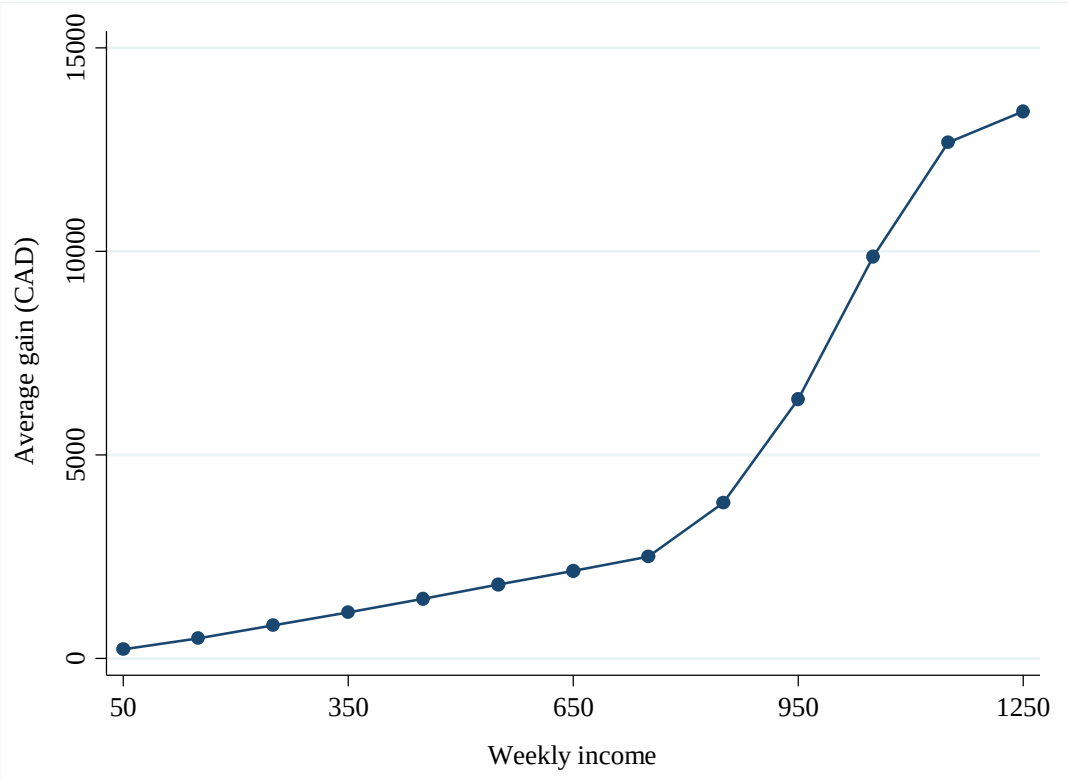
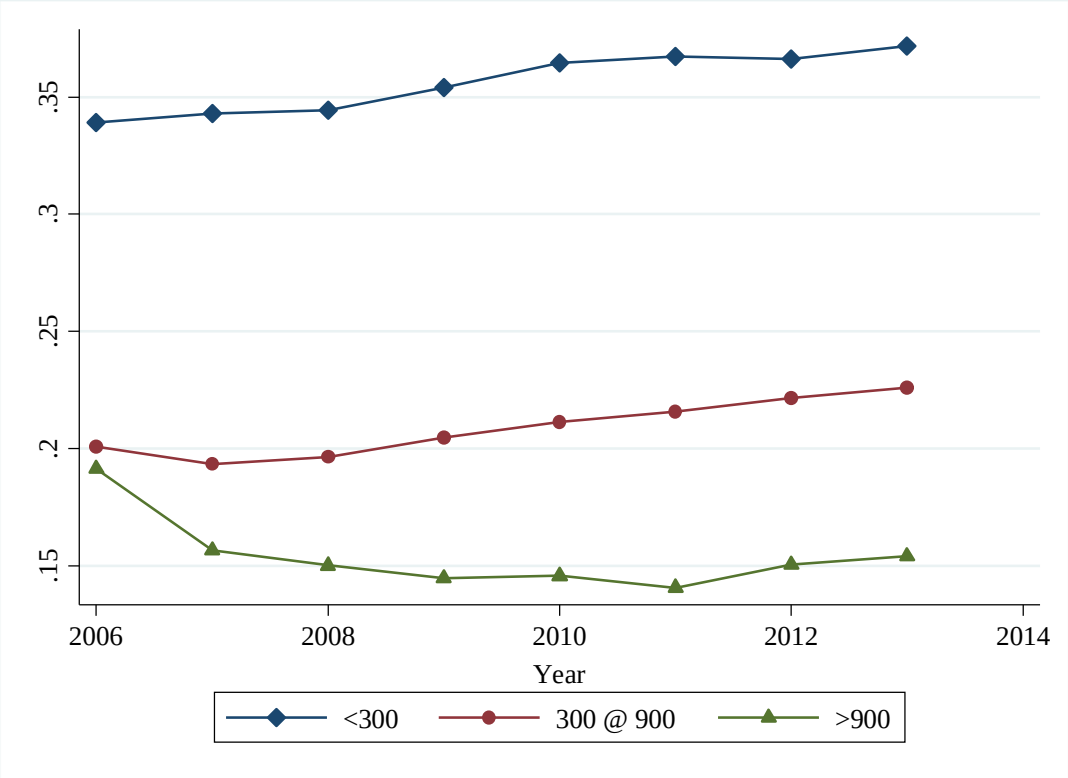
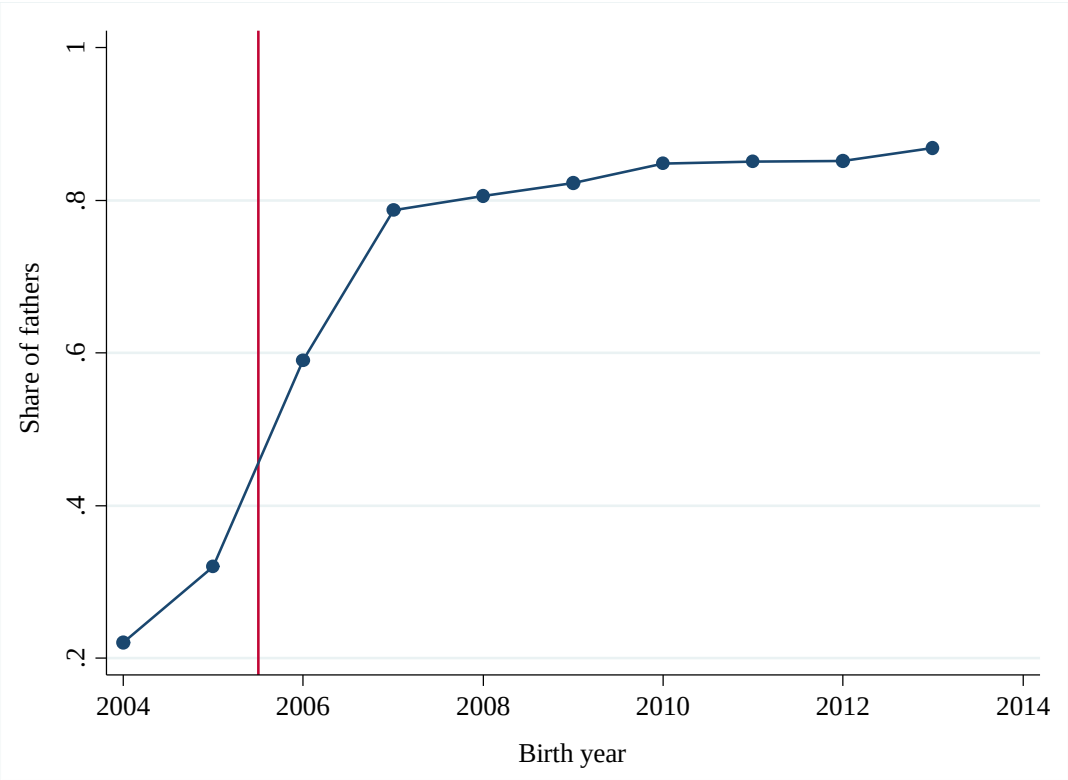


Figure 2: Percentage of mothers taking the short option by income category



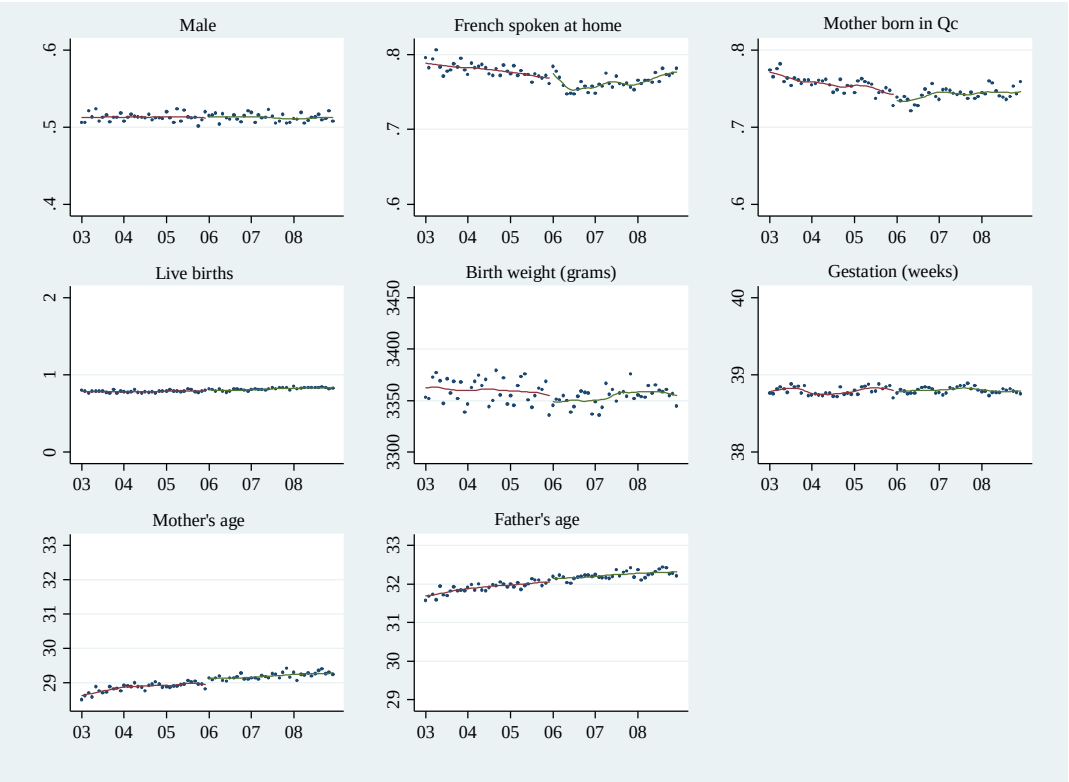
Note: This figure shows the percentage of mothers selecting the short option over time by average weekly insurable income.

Figure 3: Share of fathers taking paternity leave



Note: Own calculation using QPIP administrative records for 2005 to 2013, and Marshall (2008) for years 2004 and 2005.

Figure 4: Child and family characteristics at birth over time



Note: Own calculation using the vital statistics administrative database. Includes all births in Québec.

11 TABLES

Table 1: Federal vs Québec parental leave programs

	Before		After - QPIP			
	Federal plan		Option 1		Option 2	
	Duration (weeks)	Income replacement (percent)	Duration (weeks)	Income replacement (percent)	Duration (weeks)	Income replacement (percent)
Maternity	15	55	18	70	15	75
Parental	35	55	7	70	25	75
			25	55		
Paternity			5	70	3	75
Maximum insurable income						
Year 2006	39,000		57,000		57,000	
Year 2014	48,600		69,000		69,000	

Table 2: Descriptive Statistics

		ROC		Québec	
		Pre	Post	Pre	Post
Child characteristics					
Age (months)		16.29	13.37	15.76	12.71
Male		0.51	0.52	0.52	0.51
Siblings		0.93	0.88	0.79	0.80
Birth weight	Normal (>=2500g)	0.92	0.93	0.95	0.93
	Low (1500 - 2499g)	0.05	0.05	0.04	0.06
	Very low (<1500g)	0.01	0.01	0.01	0.00
	Missing	0.02	0.01	0.00	0.01
Premature	No	0.88	0.88	0.89	0.90
	Yes	0.11	0.11	0.10	0.09
	Missing	0.01	0.01	0.00	0.01
Multiple births	No	0.96	0.96	0.97	0.96
	Yes	0.03	0.03	0.03	0.03
	Missing	0.00	0.01	0.00	0.01
Neonatal care	No	0.83	0.82	0.83	0.82
	Yes	0.16	0.17	0.17	0.17
	Missing	0.00	0.01	0.00	0.01
Breastfed	No	0.13	0.10	0.19	0.17
	Yes	0.69	0.61	0.65	0.54
	Missing	0.18	0.29	0.16	0.29
Maternal characteristics					
Age at first birth		26.46	26.68	26.31	26.83
Age at birth		29.52	29.67	28.76	29.47
Single parent		0.13	0.11	0.09	0.07
Immigrant (last 4 years)		0.07	0.09	0.09	0.08
Maternal education					
Less than high school		0.10	0.09	0.09	0.09
High school graduation		0.17	0.19	0.09	0.13
Beyond high school		0.13	0.13	0.15	0.09
College and university degree		0.58	0.56	0.66	0.65
Missing		0.02	0.02	0.01	0.04
Paternal education					
Less than high school		0.10	0.07	0.12	0.08
High school graduation		0.15	0.18	0.11	0.14
Beyond high school		0.11	0.13	0.14	0.11
College and university degree		0.50	0.49	0.53	0.57
Missing		0.15	0.13	0.11	0.10
N		5,099	4,534	867	922

Note: Shows the summary statistics for children aged 0 to 1 year old in the NLSCY.

Table 3: Descriptive statistics on parental compensation and time investment

	ROC		Québec				
	Pre	Post	Pre	Post	N	DID	t-stat
Maternal income from work	13,403	13,329	14,779	14,271	9,091	-433	0.87
	(19,460)	(19,026)	(17,992)	(18,344)			
Maternal benefits	7,352	8,244	7,325	10,774	9,116	2,556	8.91
	(11,672)	(11,019)	(9,333)	(14,076)			
Paternal income from work	49,228	56,035	37,087	46,100	4,622	2,206	2.36
	(36,386)	(38,928)	(20,376)	(38,844)			
Paternal benefits	455	576	940	1387	4,639	375	3.96
	(2,066)	(2,480)	(2,740)	(3,589)			
Child age when mother returned to work (mths)	10.33	10.54	10.24	10.78	11,093	0.32	3.75
	(3.20)	(2.99)	(3.03)	(2.35)			
Breastfeeding duration (mths)	5.57	5.18	5.13	5.04	8,577	0.31	6.83
	(2.14)	(2.19)	(2.24)	(2.23)			

Table 4: Descriptive statistics on child development at age 2 to 3 years old

	ROC		Québec				
	Pre	Post	Pre	Post	N	DID	t-stat
Child health recently	1.45	1.43	1.53	1.46	10954	-0.04	3.82
	(0.70)	(0.67)	(0.78)	(0.71)			
Child general health	1.18	1.22	1.27	1.31	10953	0.00	0.00
	(0.49)	(0.55)	(0.65)	(0.62)			
MSD	98.63	99.32	97.62	99.44	10557	1.13	1.97
	(14.95)	(15.37)	(14.17)	(14.1)			
Hyperactivity	3.60	3.75	3.68	3.64	10680	-0.19	2.50
	(2.30)	(2.32)	(2.40)	(2.30)			
Emotional disorder	1.23	1.48	1.35	1.42	10747	-0.18	2.94
	(1.48)	(1.61)	(1.53)	(1.62)			
Agression disorder	4.58	4.81	4.58	4.72	10666	-0.09	1.04
	(2.85)	(2.75)	(3.03)	(3.01)			
Separation	2.54	2.79	2.60	2.72	10751	-0.13	3.49
	(2.00)	(2.02)	(1.90)	(1.97)			

Table 5: Estimated impact on parental benefits and time at home

Period (Birth year)		2003 to 2008					2004 to 2007	High Educ	Low Educ
Control Group		ROC				Ontario	ROC	ROC	ROC
		(1)	(2)	(3)	(4)	(5)	(6)		
Maternal income	*coef.*	-433	-435	-1380**	-1558***	-768***	-1009***	-1007*	-2475***
from work	*std.*	(499)	(520)	(617)	(545)	(54)	(375)	(530)	(529)
	N	9,091	9,091	9,091	9,008	3,778	5,869	5,037	3,871
Maternal benefits	*coef.*	2556***	2663***	2528***	2729***	2643***	2991***	3445***	1312***
	std.	(287)	(230)	(246)	(192)	(182)	(110)	(295)	(281)
	N	9,116	9,116	9,116	9,033	3,791	5,883	5,062	3,871
Paternal income	*coef.*	2206***	2712***	355	256	4	918	-4	-318
from work	*std.*	(935)	(915)	(947)	(892)	(261)	(910)	(2053)	(2401)
	N	4,622	4,622	4,622	4,589	2,050	3,017	2,756	1,777
Paternal benefits	*coef.*	375***	383***	442***	466***	350**	163***	436***	553***
	std.	(95)	(92)	(74)	(75)	(57)	(50)	(119)	(108)
	N	4,639	4,639	4,639	4,606	2,056	3,028	2,770	1,780
Child age when mother	*coef.*	0.32***	0.32***	0.33***	0.33***	0.22***	0.23***	0.62***	-0.06
returned to work	*std.*	(0.08)	(0.09)	(0.11)	(0.11)	(0.00)	(0.13)	(0.14)	(0.10)
	N	11,093	11,093	11,093	11,004	4,449	7,243	6,199	4,646
Breastfeeding	*coef.*	0.31***	0.31***	0.25***	0.26***	0.32**	0.15***	0.36***	0.07
duration	*std.*	(0.05)	(0.04)	(0.05)	(0.04)	(0.01)	(0.05)	(0.06)	(0.06)
	N	8,577	8,577	8,577	8,522	3,361	5,981	4,994	3,438
Child age in month dummies		no	yes	yes	yes	yes	yes	yes	yes
Time trend		no	yes	yes	yes	yes	yes	yes	yes
Child and family characteristics		no	no	yes	yes	yes	yes	yes	yes
Infant health characteristics		no	no	no	yes	yes	yes	yes	yes

Note: Standard errors are in parentheses and all are bootstrapped to account for the sampling design of the NLSCY. Statistical significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1.

Table 6: Estimated impact on 2- to 3-year-olds

Period (Birth year)		2003 to 2008					2004 to 2007	High Educ	Low Educ
Control Group		ROC				Ontario	ROC	ROC	ROC
		(1)	(2)	(3)	(4)	(5)	(6)		
Child Health	*coef.*	-0.04***	-0.05***	-0.03**	-0.03***	-0.02***	-0.02***	-0.02	-0.03**
recently	*std.*	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
	N	10,954	10,954	10,954	10,806	3,501	7,249	6,206	4,203
Frequency in	*coef.*	0.00	0.00	0.01	0.00	0.01**	0.03*	-0.03**	0.06***
good health	*std.*	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)	(0.02)
	N	10,953	10,953	10,953	10,806	3,501	7,249	6,206	4,203
Standardised	*coef.*	1.13**	1.12*	0.80	0.97	1.83***	1.29**	0.98	0.10
MSD Score	*std.*	(0.57)	(0.65)	(0.66)	(0.49)	(0.01)	(1.15)	(0.64)	(0.90)
	N	10,557	10,557	10,557	10,416	3409	6,976	6,058	4,093
Hyperactivity	*coef.*	-0.19**	-0.18**	-0.12	-0.10	-0.15***	-0.01	-0.14	0.12
Score	*std.*	(0.08)	(0.08)	(0.07)	(0.07)	(0.02)	(0.10)	(0.12)	(0.08)
	N	10,680	10,680	10,680	10,541	3,424	7,078	6,127	4,105
Emotive	*coef.*	-0.18***	-0.18***	-0.16***	-0.15**	-0.17***	0.03	-0.18***	0.02
Score	*std.*	(0.06)	(0.06)	(0.05)	(0.05)	(0.02)	(0.06)	(0.06)	(0.07)
	N	10,747	10,747	10,747	10,606	3,443	7,132	6,145	4,145
Agression	*coef.*	-0.09	-0.11	-0.10	-0.05	-0.14**	0.04	-0.20	0.26**
Score	*std.*	(0.08)	(0.09)	(0.09)	(0.09)	(0.07)	(0.11)	(0.16)	(0.09)
	N	10,666	10,666	10,666	10,524	3,414	7,065	6,091	4,118
Separation	*coef.*	-0.13***	-0.13***	-0.10***	-0.09***	-0.06**	-0.04	-0.02	-0.13**
Score	*std.*	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.06)	(0.07)
	N	10,751	10,751	10,751	10,611	3,447	7,131	6,142	4,148
Child age in month dummies		no	yes	yes	yes	yes	yes	yes	yes
Time trend		no	yes	yes	yes	yes	yes	yes	yes
Child and family characteristics		no	no	yes	yes	yes	yes	yes	yes
Infant health characteristics		no	no	no	yes	yes	yes	yes	yes

Note: Standard errors are in parentheses and all are bootstrapped to account for the sampling design of the NLSCY. Statistical significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1.

Table 7: Estimated impact on health care costs

Child age		0-5 mths	6-11 mths	$\leqslant$ 1 yr	$\leqslant$ 2 yr	$\leqslant$ 3 yr	$\leqslant$ 5 yr	$\leqslant$ 7 yr
All	RDDx	-21.58	28.17***	6.60	-9.21	-6.45	-13.61	-14.23
	(N=18000)	(15.53)	(7.05)	(18.63)	(22.95)	(25.47)	(30.62)	(35.14)
Non-assisted	RDDx	-17.88	31.01***	13.13	-4.40	-0.85	-3.92	-2.61
	(N=16348)	(16.81)	(7.59)	(20.09)	(24.61)	(27.14)	(32.27)	(36.97)
Assisted	RDDx	-64.00**	-0.78	-65.78*	-67.64	-70.59	-119.44	-138.37
	(N=1652)	(27.92)	(15.25)	(37.62)	(55.06)	(70.09)	(97.11)	(114.27)
	DiDx	43.98	32.78*	76.76*	62.70	71.49	116.97	138.93
	(N=18000)	(32.48)	(17.15)	(42.62)	(60.27)	(74.44)	(101.27)	(118.66)

Note: Statistical significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1.

Web Appendix

Catherine Haeck, Philip Merrigan and Samuel Paré

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Table A. 1: Descriptive Statistics

		ROC		Québec	
		Pre	Post	Pre	Post
Child characteristics					
Age (months)		35.8	33.5	35.4	33.9
Male		0.51	0.53	0.52	0.50
Siblings		1.16	1.12	1.04	1.08
Birth weight	Normal (>=2500g)	0.91	0.90	0.93	0.91
	Low (1500 - 2499g)	0.05	0.06	0.04	0.06
	Very low (<1500g)	0.01	0.01	0.01	0.01
	Missing	0.02	0.03	0.01	0.02
Premature	No	0.86	0.88	0.90	0.91
	Yes	0.12	0.11	0.10	0.09
	Missing	0.02	0.01	0.01	0.00
Multiple births	No	0.95	0.97	0.97	0.98
	Yes	0.04	0.03	0.03	0.02
	Missing	0.01	0.00	0.00	0.00
Neonatal care	No	0.82	0.84	0.82	0.87
	Yes	0.17	0.16	0.17	0.13
	Missing	0.01	0.00	0.00	0.00
Breastfed	No	0.13	0.12	0.18	0.15
	Yes	0.70	0.78	0.67	0.72
	Missing	0.17	0.10	0.15	0.12
Maternal characteristics					
Age at first birth		26.60	26.83	26.21	26.85
Age at birth		29.69	29.81	28.71	29.65
Single parent		0.14	0.14	0.13	0.12
Immigrant (last 4 years)		0.04	0.04	0.06	0.03
Maternal education					
Less than high school		0.10	0.07	0.10	0.08
High school graduation		0.17	0.19	0.10	0.09
Beyond high school		0.13	0.07	0.12	0.11
College and university degree		0.59	0.56	0.68	0.63
Missing		0.01	0.12	0.00	0.09
Paternal education					
Less than high school		0.10	0.05	0.10	0.05
High school graduation		0.16	0.17	0.12	0.13
Beyond high school		0.11	0.09	0.13	0.12
College and university degree		0.50	0.44	0.54	0.53
Missing		0.13	0.25	0.11	0.17
N		5,609	3,947	861	545

Note: Shows the summary statistics for children aged 2 to 3 years old in the NLSCY.

Table A. 2: Estimated impact on health care costs - Robustness checks

Child age		0-5 mths	6-11 mths	⩽ 1 yr	⩽ 2 yr	⩽ 3 yr	⩽ 5 yr	⩽ 7 yr
Top 1 percent censured								
All	RDDx	-14.76***	28.37***	16.03**	2.27	0.90	0.34	3.05
	(N=18000)	(4.22)	(3.03)	(6.43)	(10.40)	(12.95)	(17.07)	(20.51)
Non-assisted	RDDx	-11.21**	30.59***	21.75***	6.91	4.82	5.17	9.92
	(N=16348)	(4.40)	(3.17)	(6.72)	(10.88)	(13.59)	(17.96)	(21.58)
Assisted	RDDx	-53.14***	5.25	-45.02**	-52.12	-46.95	-56.51	-75.50
	(N=1652)	(14.76)	(10.30)	(21.93)	(34.73)	(42.21)	(53.95)	(65.42)
	DiDx	40.51***	25.16**	65.13***	56.68	49.50	61.90	84.84
	(N=18000)	(15.16)	(10.74)	(22.82)	(36.40)	(44.37)	(57.08)	(69.11)
Top 2,5 percent censured								
All	RDDx	-11.95***	27.36***	17.74***	3.80	2.00	2.28	6.94
	(N=18000)	(3.18)	(2.57)	(5.20)	(8.85)	(11.23)	(14.92)	(18.02)
Non-assisted	RDDx	-9.11***	29,11***	22.53***	8.68	7.62	7.26	13.49
	(N=16348)	(3.32)	(2.70)	(5.43)	(9.28)	(11.78)	(15.65)	(18.90)
Assisted	RDDx	-42.69***	8.39	-33.63*	-52,1*	-62,48*	-54.74	-65.15
	(N=1652)	(11.08)	(8.39)	(18.01)	(28.71)	(36.80)	(49.12)	(59.62)
	DiDx	32.81***	20.32**	54.66***	59,72**	68,92*	62.58	78.52
	(N=18000)	(11.41)	(8.74)	(18.64)	(30.18)	(38.40)	(51.38)	(62.47)

Table A. 3: Frequency of selected medical conditions - Model DiDx

Child age	0-5 mths	6-11 mths	⩽ 1 yr	⩽ 2 yr	⩽ 3 yr	⩽ 5 yr	⩽ 7 yr
Respiratory infection	0.027	0.051	0.078	0.047	0.086	0.078	0.106
	(0.045)	(0.048)	(0.074)	(0.108)	(0.134)	(0.168)	(0.189)
Osteitis media	0.005	0.030	0.034	-0.001	0.094	0.110	0.117
	(0.012)	(0.037)	(0.040)	(0.089)	(0.117)	(0.147)	(0.166)
Asthma	-0.005	-0.013	-0.017	-0.051	-0.084	-0.180	-0.266
	(0.010)	(0.027)	(0.031)	(0.064)	(0.091)	(0.134)	(0.169)
Pyrexia of unknown origin	0.019	0.007	0.025	0.008	0.013	0.046	0.063
	(0.039)	(0.028)	(0.050)	(0.074)	(0.083)	(0.091)	(0.098)
Cellulitis & abscesses	-0.014	-0.005	-0.018	-0.013	0.009	-0.012	-0.001
	(0.013)	(0.004)	(0.013)	(0.017)	(0.038)	(0.049)	(0.053)
Cough	-0.003	0.009	0.006	-0.005	0.005	-0.008	-0.025
	(0.025)	(0.017)	(0.031)	(0.040)	(0.047)	(0.056)	(0.068)
Bronchiolitis	0.063	0.062	0.125	0.193	0.192	0.193	0.196
	(0.087)	(0.068)	(0.124)	(0.144)	(0.148)	(0.148)	(0.148)
Gastroenteritis & colitis	-0.008	-0.017	-0.025	-0.020	0.004	-0.007	-0.012
	(0.013)	(0.025)	(0.028)	(0.053)	(0.059)	(0.063)	(0.065)
Angina	-0.004	-0.006	-0.010	0.005	-0.001	0.020	0.039
	(0.003)	(0.006)	(0.007)	(0.019)	(0.026)	(0.039)	(0.050)
Diabetes	0.001	-0.001	0.000	-0.003	-0.007	0.006	0.014
	(0.001)	(0.001)	(0.002)	(0.006)	(0.008)	(0.019)	(0.029)
Allergies	0.008	-0.014	-0.005	-0.010	-0.003	0.008	-0.006
	(0.010)	(0.009)	(0.014)	(0.019)	(0.021)	(0.027)	(0.034)
Allergic rhinitis	-0.001	0.002	0.001	-0.006	0.007	0.034	0.050
	(0.008)	(0.006)	(0.011)	(0.013)	(0.015)	(0.020)	(0.025)
Lymphocytic leukemia	0.001	0.000	0.001	0.000	-0.001	0.090	0.202
	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.110)	(0.222)
Myeloid leukemia	0.000	0.000	0.000	-0.002	-0.003	-0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.004)	(0.007)
Tumor of the nervous and endocrine system	0.000	0.000	0.000	0.000	0.001	0.003	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.014)	(0.017)

Note: Shows the DIDx estimates using the entire sample (N=18,000).

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Evidence on Maternal Health from Two Large Canadian Parental Leave Expansions: When is Enough Too Much?

Catherine Haeck, Pierre Lefebvre, and Philip Merrigan
Department of Economics
Université du Québec à Montréal

August 2015

Abstract

Exploiting unique administrative longitudinal data sets on medical services provided to mothers before- and after- delivery, we estimate the causal effects of two large distinct parental leave reforms on maternal health outcomes, over the 5 years postpartum. The health outcomes are objective measures based on all types of medical services provided by physicians. For mothers publicly insured by the public prescription drug plan we can also identify all drugs used, in particular those associated with depressive symptoms. The long time span of the longitudinal administrative data sets allows an assessment of short-run and long-run effects of maternity leave on mothers' health. The empirical approach uses a strict regression discontinuity design based on the day of regimes change. The large samples of mothers, who gave birth three months before and three months after the two policy changes (in 2001 and 2006), are drawn randomly from the population of delivering women, all covered by the universal public health care program. We do not find any evidence that the reforms having sizeable impacts on maternal health care costs, of a physical or of a mental nature, as measured by physicians' fee-for-service billing costs, prescription drug costs, or the number of hospitalizations. The last expansion has given rise to large fiscal costs over time as well as some socioeconomic inequities.

JEL Classification: I12 and I18

Keywords: maternal leave reform (2001 and 2006), longitudinal health administrative data, physical and mental health, costs and prescription drugs, universal public health and drugs insurance, parametric and non-parametric regression-discontinuity design

This analysis is based on the Régie de l'assurance maladie du Québec anonymized data files extracted from the Registries on medical services provided by the Québec Health Insurance Plan and the Public Prescription Drug Insurance Plan. All computations on these micro-data were prepared by the authors who assume the responsibility for the use and interpretation of these data. This research was funded by the Fonds de recherche du Québec (Health, Society and Culture), and the Ministry of Health and Social Services.

1. Introduction

The widespread increase in women's labor force participation in the seventies and eighties during childbearing years have lead most developed countries to adopt national maternity leave policies to support parents in their efforts to care for newborn children while remaining attached to the labor market.[1] Within the European Union, since the 1990s, a minimum of 3 months parental leave is mandatory, and there is a binding guideline for at least 14 weeks of maternity leave.[2] Governments generally provide two types of support for the parents of infants: protected job leave and publicly provided financial support (for both maternity and paternity leave). Of course, these provisions and guidelines have led to heterogeneous parental leave policies in the developed world. Across countries, there are wide variations in the duration of job protection and direct financial support, with complex systems of fully-paid, partially-paid, and unpaid leave (Ray, Gornick, and Schmitt, 2009).[3]

Moreover, in a few cases, regional policies differ significantly within a given country. For example, in Canada, parental leave job-protection is legislated at the provincial level. Hence, the resulting guarantees vary widely over time (Baker and Milligan, 2008b), from modest beginnings in the 1970s (17-18 weeks of protected leave) to a widespread expansion in 2000 (52 weeks in most provinces and up to 70 weeks in the Province of Québec). With regards to parental leave benefits, the Canadian federal government has its own a national policy, but Québec having opted out of the federal program in 2006, offers its own parental leave with more extended coverage and higher benefits. In contrast, the United States has no national legislation for paid parental leave, but several states have established social insurance schemes to support new parents.[4]

Although one of the fundamental objectives of maternity leave policies is the enhancement of maternal and child health and well-being, there is limited evidence on links between parental leave policies and maternal health outcomes, in particular on the effects of leave duration and the enhancement of benefit levels. Nevertheless, several studies using cross-sectional, longitudinal or cross-country data were conducted evaluating the links between the length of maternity leave and child health (and breastfeeding), where length is mostly defined as the number of out-of work weeks after childbirth (few studies

[1] In Canada, maternity benefits as part of the federal unemployment insurance program were introduced in 1971.
[2] According to the OECD Family database, the median number of paid weeks of leave among OECD countries had risen from 14 in 1980 to 42 by 2001.
[3] Most of the national policies for 21 high-income economies reviewed by Ray et al. (2009), as of June 2008, provide between three months and one year of full-time-equivalent paid leave; Sweden, the most generous of the countries examined, provides 40 weeks of full-time-equivalent paid leave. The United States is one of only two countries to offer no paid parental leave. Australia also offers no paid leave, but supports new parents with a substantial financial "baby bonus" regardless of whether they take parental leave.
[4] New parents in the United States may access leave through the Family Medical Leave Act (FMLA) of 1993. FMLA leave consists of 12 weeks of unpaid leave with health coverage that must be taken continuously and on a full-time basis, if employed by a firm with more than 50 workers. In addition, more or less 28 states offer either partially-paid disability leave for new parents.

distinguishing paid from unpaid leaves).[5] The influence of parental leave on child health and development has proved particularly difficult to demonstrate given the number of potential influences and the extended time period necessary for meaningful assessment (Baker and Milligan, 2012; Haeck, 2013; Brook-Gunn, Han, and Waldfogel, 2010). Results on the impact of maternal leave on children's physical health have been mixed with regards to the association between parental leave and infant mortality, birth weight and premature birth, breastfeeding incidence and duration (Ruhm, 2000; Rossin, 2012; Tanaka, 2005; Baker and Milligan, 2008a).

A handful of studies in economics have investigated the short-term and long-term impacts of leave duration on maternal health and well-being. A number of micro-data studies have been conducted (mainly from the United States) based on surveys of mothers who worked during pregnancy and returned to work a few months after childbirth. The results show that longer leaves are related to statistically significant reductions in depressive symptoms and parental stress, as well as a higher prevalence and duration of breastfeeding (recognized both as conducive to maternal and child health), but with no clear relation with effective or hostile parenting . However, in most studies, maternal measures of health, whether physical or mental (such as the incidence of depressive symptoms pre- and postpartum) as well as vitality and role function, are self-assessed by the mother (e.g. for the United States, see Chatterji et al., 2013, 2012, 2011, 2008, 2005; for Canada, see Baker and Milligan, 2010, 2008b, 2008b;). Clearly reported health contributes to the overall perceived well-being of the mother. In this sense, these studies bring considerable value to the literature, but it remains an open question whether improved self-reported health translate into less medical services and cost savings.

More recent European studies (reviewed below) have used plausibly exogenous policy changes (longer periods of entitlements, expansion of paid and unpaid leave) to identify the effects of maternity leave policy on mothers' health outcomes (and children). Context matters for the results, such as in a setting where universal health insurance is provided by governments, which is the case in Sweden, Norway or Canada.

Here, in the Canadian context of "a single payer universal health insurance policy", we estimate the causal effects of two different expansions of maternity leave policies on the health of mothers. The first reform implemented on 1st January 2001 added 25 weeks of benefits and leave (from a policy with 15 weeks of maternity leave and 10 weeks of parental leave) that could be split between the mother and the father, providing a total potential entitlement of 50 weeks of leave and benefits to mothers giving birth. The second policy change, implemented only in the province of Québec as of 1st January 2006, resulted in higher replacement ratios of pre-birth earnings, increased insurable earnings, and relaxed eligibility rules.

[5] For surveys see Staehelin, Bertea, and Stutz, 2007; Tanaka, 2005.

Exploiting unique administrative data sets extracted from the 'Régie de l'assurance maladie du Québec' (RAMQ)[6] Medical Registers of all billable medical acts provided to a large random sample of mothers giving birth before and after the policy changes, we estimate the impact of both policies on maternal health outcomes as measured by physician costs.

The Province of Québec provides universal health insurance covering all its citizens by way of the Medical Insurance Act, a provincial legislation highly constrained by federal laws. Practically all physicians (specialists or generalists) practice medicine within the confines of this legislation. If they wish to practice privately, and very few do, they cannot practice within the public system. When a physician renders a service or services to a patient covered by public insurance, he will bill the RAMQ for each service that he undertakes. The fee for each service is negotiated with the government by national medical boards representing either generalists or specialists. What we obtained from the RAMQ are the physicians' invoices which include details of each service rendered to the patient and its corresponding fee. The actual amounts paid to the physicians are almost the same as the amounts requested on the invoices. Some physicians within the public system do not work within the fee per service framework. We do not have access to any costs related to such services. However, the majority of services provided by physicians are billed as fee per service amounts. Some services can be provided in a private clinic, but bills are forwarded to the RAMQ for payment to physicians.

Moreover, in Québec, since 1997, every citizen must be covered by a prescription drug insurance. A private plan is a group insurance or employee benefit plan offering basic coverage for prescription drugs. Private plans are usually available through employment, in the form of a group insurance, which an employer may offer to its employees as a fringe benefit. Persons who are not eligible for a private plan must register for the Public Prescription Drug Insurance Plan (PDIP). The RAMQ also provided us with the PDIP Registers for mothers insured by the Plan at time of delivery.

For this study, we asked the RAMQ to select two groups of mothers (drawn randomly each day of the month): (1) mothers who gave birth from October 2000 to March 2001, three months before and after the changes in maternity leave legislation in Canada; and (2) mothers who gave birth between October 2005 and March 2006, again three months before and after the start of Québec's new maternity leave policy, exclusive to this province.

These groups of mothers enable us to adopt a strict regression discontinuity approach to estimate the policy impacts. This approach is now well established in the empirical literature (e.g. van der Klaauw, 2008; Lee and Lemieux, 2010). In all, we observe 36,000 mothers equally divided (18,000) in the two groups, and on a monthly basis they represent approximately two-thirds of all mothers giving birth,

[6] Québec's health insurance authority, the 'Régie de l'assurance maladie du Québec' (RAMQ), created in 1971, became the sole public agency authorized by the government to pay for services provided by physicians participating in the public system (practically all of them). The RAMQ pays directly to physicians their bills for medical services given to patients.

according to the Québec Monthly National Registry of Births. The RAMQ extracted from the medical registries all the medical services provided by physicians to these mothers and billed to the RAMQ (two years before birth and up to five years following this same birth). In total we observe 2.9 million medical services over the seven-year time-span (1.419 and 1.466 million respectively for the two groups). A diverse number of variables are available for each service: costs (that is payments to physicians) for the RAMQ, type of service (examination, consultation, or psychiatric, surgical, and technical service), related diagnostics (e.g. natural birth, caesarean birth, multiple birth, birth complications, depressive disorders, anxiety disorders, hypothyroidism, etc.), and site of treatment (e.g. outpatient in physicians' offices or hospitals, inpatient in hospitals or emergency rooms, and laboratories), and the date for each service. The prescription drug records provide the pharmacologic-therapeutic reason for the drug as well as total cost and net cost of each prescription (netting out co-insurance and co-payments). We also observe the age of the mothers by category as well as their region of residence (as a proxy of where the delivery took place).

Our study adds to the scarce economic literature that estimate maternal leave impacts on maternal health with unique contributions when compared to other studies on the same topic: (1) we examine the health effects of maternal leave expansions with large samples of mothers who gave birth shortly before and after two large-scale reforms; (2) we observe a large sample of 36,000 mothers, all covered by a universal public health care program; (3) the health outcomes are objective measures based on all types of physician services provided by the universal health insurance plan in Québec as well as their associated diagnostics; (4) for mothers publicly insured by the public prescription drug plan we can identify all drugs purchased, in particular those associated with depressive symptoms; (5) the long time span of the longitudinal administrative data sets with mothers' medical records allows us to discriminate between potential short-run and long-run effects of maternity leave extensions; (6) the empirical approach uses a rather stringent regression discontinuity design based on the day of delivery.

The rest of the paper is structured as follows. Section 2 presents the institutional setting and reforms in Canada with regards to maternal leave policy. Section 3 reviews previous empirical findings on health-related benefits of maternal leave. Section 4 contains the empirical approach and identification strategy. Section 5 describes the data sets used, sample characteristics and descriptive statistics. Section 6 displays the estimated effects of the policy and their interpretation. Section 7 discusses briefly the costs and benefits of Québec's program. Section 8 concludes.

2. Institutional setting and parental leave changes in Canada

The Canadian Employment Insurance Maternity and Parental Benefits Program (CEIP)[7]

In Canada, maternity benefits were introduced in 1971 as part of the federal Unemployment Insurance (UI) program. To be eligible, mothers were required to accumulate 20 weeks of "insurable" employment

[7] We draw from Phipps (2006) for the policy changes in maternal benefits over the last decades.

during the year before giving birth and starting maternity leave (i.e. weeks with at least 15 hours of paid work and wages that amounted to at least 20 percent of the maximum insurable earnings determined by law). Eligible mothers were entitled to 15 consecutive weeks of benefits following a 2-week waiting period. Benefits were paid at two-thirds the level of past wages, up to a maximum of $150 per week (in 1971 dollars); 8 weeks prior to the expected week of delivery and 6 weeks afterward (8 + 1 + 6). Two decades later, in 1990, 10 weeks of parental leave benefits were added with a 60% replacement rate for both maternity and parental benefits with a ceiling for insurable earnings. Biological fathers and mothers were allowed to share the 10 weeks of parental benefits (both had to serve a 2-week waiting period before receiving benefits). In 1994, the replacement rate was reduced to 55 percent; claimants with low wages (less than 50 percent of maximum insurable earnings) became eligible for a special "dependency replacement rate" of 60 percent. In 1997, "Employment Insurance" (EI) replaced "Unemployment Insurance" (UI), with eligibility requirements changing from 20 weeks of paid work to 700 hours of paid work. More significant changes were implemented in December 2000 (for the mothers of children born or adopted after December 31st): parental leave benefits were increased from 10 to 35 weeks, potentially increasing the total maternity leave time from six months to 50 weeks (considering a 2 weeks waiting period). The waiting period was reduced to 1 week for parents who shared weeks of parental leave. The threshold for eligibility was lowered from 700 to 600 hours of insurable employment. The replacement rate remained unchanged at 55% of pre-birth weekly insurable earnings. From 1996 to 2006, insurable earnings remained capped at $39,000 nominally.

Parental leave job-protection legislation is a provincial prerogative in Canada. In the 1970s and 1980s the policy was rather stringent but considerably improved over the years (to 52 weeks in almost all provinces at the end of year 2000, with a phasing in of the 2001federal leave expansion). Box 1 presents the main parameters of parental leave programs in Canada to be considered for our analysis.

The Québec Parental Insurance Program (QPIP)

In March 2005, the province of Québec opted out of the federal maternity/parental benefits program (the federal government estimated the part of total payroll tax in the EI used to finance the leave program; Québec's taxpayers wage earners and employers were given a rebate on EI contributions) and began its own Parental Insurance Program (QPIP), for mothers and fathers of a child born or adopted as of January 1st 2006. In this plan, parents choose between two options (see Box 1). The basic plan includes 18 weeks of maternity leave and benefits, as well as 32 weeks of parental leave and benefits which can be taken by either parent. The basic plan compared to the alternative below, offers a longer leave but lower replacement rates following the initial 18 weeks of maternity leave. The 18 initial weeks of maternity benefits are valued at 70 percent of previous earnings, 7 weeks of parental benefits are available with a 70 percent replacement rate and an additional 25 weeks of benefits is offered at a 55 percent replacement rate

which can be divided between both parents.[8] The second option offers a shorter leave but higher replacement rates: mothers are entitled to 15 weeks of maternity benefits and leave with a 75 percent replacement rate and 25 weeks of parental benefits valued at 75 percent of earnings which can be split between mothers and fathers. The program also offers two paternity benefit plans which are exclusive to fathers: a 5 week leave with a 70 percent replacement rate or 3 weeks with a rate of 75 percent. The new regime (compared to the federal plan) increased maximum insurable earnings, from $39,000 to $57,000 in 2006, and increased every year since, benefiting parents with higher earnings. The replacement rate of 75 percent under the special shorter plan is considerably higher than the CEIP rate in the other provinces (55 percent), though this plan also offers a total duration of benefits of 43 weeks for mother and father combined, compared with 50 weeks under CEIP. The basic plan offers higher replacement rates than the CEIP during the first part of the leave (70 percent) and the same replacement rates as CEIP during the second part of the leave (55 percent); the total duration of benefits for mother and father combined is slightly higher in the Québec plan (55 weeks for the Québec basic plan compared with 50 weeks under CEIP). Another feature of the Québec plan is that no waiting period is imposed before benefits are received (compared with a 1-week waiting period, which one parent must serve under the CEIP). Like the CEIP, both Québec plans offer a higher replacement rate for lower-income families (the same as the CEIP). Eligibility for benefits is based on earnings of at least $2,000 in the year prior to the birth (or adoption) of the child. The Québec plan covers self-employed individuals (not covered by the CEIP) as well, and the shorter qualifying period increases the number of families which are eligible for the program. At the minimum wage in Québec effective on 1st May 2005 - $7.65 - it took 258 hours of work to become eligible for benefits under the Québec plan, considerably less than the 600 hours required in 2006 to be eligible for the CEIP.[9]

A Public Prescription Drug Insurance Plan (PDIP) was set up in 1997 to cover all Quebecers who were not eligible for a private plan. It is administered by the RAMQ and is intended for persons not covered by a private group insurance plan for prescription drugs, as well as for persons aged 65 or more and welfare recipients. Children of persons registered for the public plan are also covered by the same plan. Insured persons who purchase drugs covered by the plan only pay a portion of their cost. This is a deductible, plus co-insurance. The other portion is paid by the RAMQ. Generally speaking, persons covered by the public plan must pay a premium, whether or not they purchase prescription drugs.

[8] All plans have a capped amount of maternity or parental leave benefits.

[9] Employees and employers (self-employment workers assume both parts) must pay higher insurance premiums to finance Québec's parental leave program, even considering the cut in the federal employment insurance premiums granted to contributors to the Québec plan. Premiums have increased each year since the implementation of the program.

Statistics on the take-up rate of benefits and women's return to paid work after childbirth

The unconditional probability mothers' receive maternity benefits increased from only 5 percent in 1971, when they were introduced, to 60 percent by 2003. Maternity benefit coverage per live birth remained relatively constant through the 1990s, despite the introduction of parental benefits. However, maternity claims per live birth appear to have jumped since the duration of parental leave was lengthened and the reduction of hours required for eligibility (from 700 to 600) decreased in 2001 (from approximately 50 percent during the 1990s to 60 percent in the 2000s). The extension of benefits by 25 weeks was extremely well publicized, female labor force participation was higher and, of course, the total parental leave package became more attractive (Marshall 2003; Perusse 2003).

Using Canadian data, Marshall (1999) and Phipps (2000) both find that women who are not entitled to benefits return to paid work much more rapidly than women who are eligible for such benefits. Women who do not receive benefits are more likely than those who are eligible to return to paid jobs within six weeks of giving birth (Marshall); the most common pattern among women who qualify is to return to paid work at or around the time the benefit period ends (Phipps). Whether or not a woman is eligible for maternity benefits clearly affects the labor market behavior of women who have recently given birth. Phipps (2000) produces evidence that provincial regulations concerning the duration of job-protected (unpaid) leave are also a factor impacting the time women return to paid employment. That is, women tend to return to their paid jobs according to how long they can legally be away from their job. After the extension of parental benefits from 10 to 35 weeks, employed mothers receiving benefits increased (or planned to increase) their time away from work from 6 months on average in 2000 to 10 months in 2001 (Marshall 2003; Perusse 2003).One quarter of all mothers with benefits in 2001 were back to work within 8 months. These women were more likely to be observed with a temporary or low-paying job, or with a spouse who claimed parental benefits. Mean time taken off work by mothers who did not receive maternity or parental benefits and returned to work remained at four months in 2001. More mothers giving birth in the last 12 months received maternity or parental benefits in 2001 than in 2000 (61% versus 54%)—likely because of the reduced number of hours required for benefits and women's increased labor force participation. After the extension of parental benefits, fathers' participation in the program jumped from 3% in 2000 to 10% in 2001.

Using Statistics Canada National Longitudinal Survey of Children and Youth, Hanratty and Trzcinski (2009) estimate the effect of the 2001 expansion in Canadian paid family leave from 25 to 50 weeks on maternal employment and transfers. Their results indicate that the expansion was associated with an 11 percentage point (23%) increase in the time mothers took off before returning to work.

Computed with micro-data from Statistics Canada's Employment Insurance Coverage Survey (EICS) conducted yearly from 2000 to 2012, Figures 1A and 1B show respectively for Québec and the other provinces (Rest of Canada) the evolution of the percentage of mothers with a child aged 0 to 12 months

who received maternity or parental benefits (since the birth of the child). The percentages have largely increased concomitantly with the two policy changes. The Figures also indicate that the other three groups of mothers, (1) with insurable employment but no benefits, (2) who have worked within the last 2 years but with no insurable employment, (3) who have not worked in the last two years, percentages have strongly decreased in proportion over the period analyzed. In the same way, Figures 2A and 2B document the proportion of mothers in different groups ~~as~~ classified by leave duration (we aggregate mothers who report duration of leave while others report expected duration). Over time, and particularly since the leave policy modifications, a very large majority of mothers are observed with leave durations of 9 to 12 months, the largest drop is observed for durations of 5 to 8 months, the largest proportion before 2001.

In 2000-2001, the percent of mothers receiving paid maternity and parental leave benefits among previously employed mothers in Québec was respectively 76% and 78%. More than three-quarters of mothers (79%) had insurable earnings. In all, 85.9% of them received benefits in the form of maternity or parental benefits during their pregnancy or since the birth or adoption of their child. Approximately 23% of all mothers with a child one year-old or younger were not covered with employment insurance (a necessary condition for benefits). More than half of these mothers had not worked in the previous two years. In 2005, receipt of paid maternity and parental leave benefits among previously employed mothers in Québec had decreased to 73%.

According to QPIP administrative data, in 2006, 81% of the 81,950 mothers who gave birth received benefits from the new plan. Approximately 76% of the parental benefits were paid under the basic plan. Self-employed mothers or fathers represented only 4% of families receiving benefits (a little more than half chose the shorter but more generous per month of leave plan). Figure 1A, indicates that since 2006 the percentage of mothers with leave benefits increased from close to 65% in 2005 to 80% in the later years, while Figure 2A shows that since 2003, 60% of mothers with benefits declare taking or plan to take 9 to 12 months of leave before going back to work; the other mothers plan or take short leaves (5%, 0-4 months; 14%, 5-8 months), more than 1 year (10%), while 4% do not plan to return to work.

3. Empirical findings on the link between maternal health and parental leave

There is no question that pregnancy and childbirth are challenging human experiences both for mothers and their family. There has been a large increase in labor force participation over the past decades of pregnant women and mothers with infants and this makes childbearing and rearing even more challenging. A large proportion of women turn pregnant while employed, continue working late into their pregnancy, and then return to work early after giving birth. Given this reality, public policy presumes that making maternal (and parental) leave and job-protection more accessible and affordable can improve the health of pregnant women, newborns, infants, fathers, and mothers of newborn. Time-off work, job-protection, and benefits may reduce stress and enhance well-being during the postpartum period.

A few studies have used plausibly exogenous policy changes to focus on children's outcomes in relation with maternal employment during the child's first year with mixed results.[10] While maternity and parental leave do not necessarily lead to increased initiation and duration of breast-feeding, at least they offer women the choice, given the well documented health benefits for infants (Baker and Milligan, 2008a). Breast-feeding has also potential benefits for the mother such as weight loss, reduced prevalence in type-2 diabetes and cancer, and better postpartum mental health.

Studies of the effects on mothers' health and well-being of maternity leave are more limited in number, in particular in economics. Few studies have analyzed the association between extended leave policies and mothers' health outcomes in a context similar to a natural experiment. In Denmark, where the number of weeks with full benefit compensation increased from 28 to 50 weeks for mothers who gave birth on March 27 2002 or after, Humlum and Vejlin (2012), using administrative data sets and an instrumental variable method coupled with an RD design, find no effects on the mother's probability to be hospitalized with a depression, and on mothers' use of anti-depressants, but small negative effects on the number of hospitalizations. In Germany, based on various administrative data sets and a regression-discontinuity (RD) design, Guertzen and Hank (2013) results suggest significant changes in mothers' return to work behavior because of increased leave, but no convincing evidence for effects on health as identified by the number and length of absenteeism spells at work.

Dahl et al. (2013) analyze several maternity leave expansions in Norway (18 weeks in 1987 to 35 weeks in 1992; and 42 by 2011) for many different outcomes but without investigating the impacts on the health of mothers. Their results indicate that expansions had little effect on children's schooling outcomes, parental earnings, labor market participation, fertility, and marriage or divorce. The expansions also had little impact on future families' tax payments and transfers. Findings suggest that the generous benefits were costly, with no measurable effects and regressive redistribution properties.

Baker and Milligan (2008a, 2008b) analyze a major policy reform with a substantial expansion of leave duration (one of the two reforms studied in this paper) and find that extended maternity leave (job-protection and benefits duration) increased the period of time before mothers return to work, as well as breast-feeding initiation and duration among those eligible for the leave. But the estimated effects of this policy change on outcomes such as mothers' postpartum depression or self-rated health up to 2 years after birth were found to be not significant. These Canadian studies suggest that extensions beyond a relatively generous entitlement (25 weeks in Canada prior to and 50 weeks after the change) may have limited measurable impact on health outcomes. One shortcoming of the Baker and Milligan studies is that health outcomes are self-reported by the mothers. The same authors also write that an RD design is better suited

[10] See the following, for Canada, Milligan, 2010, 2015; Haeck, 2013; Germany, Dustmann and Shönberg, 2012; Norway, Carneiro et al., 2014; Sweden, Liu and Skans, 2010; in Denmark, Rasmussen, 2010. This evidence, which is less likely to be corrupted by unobservable characteristics, indicates that maternity leave extensions in Canada, Germany, Sweden and Norway did not considerably change child outcomes at various ages (the exception is Carneiro, Loken, and Salvanes, 2014).

for estimating the impact of this policy, which is the method we shall use to estimate policy effects in this paper.

Time off work for mothers after birth is associated to the postpartum health of non working mothers with positive effects on vitality and role function, smaller rates of respiratory infections, breast disease symptoms, and gynecological problems. In almost all studies with a measure depression, frequency of depressive symptoms declines for postpartum mothers with the length of maternal leave, in cases for which the window of eligible weeks increases from 6-8 weeks to 12 weeks or more (see studies by Chatterji et al.). However, Baker and Milligan (2008a, 2008b) do not find any such evidence for the impact of longer leave duration on the self-reported health status of mothers in their study of the Canadian 2001 reform**.**

On the other hand, several studies in the medical literature have found that in developed countries, 10 to 15% of mothers with a newborn are diagnosed with a major postpartum depression (O'Hara and Swain, 1996). Postpartum depression (PPD) refers to a non-psychotic depressive episode that begins in or extends into the postpartum period. PPD can evolve from a pre-existing case of the 'baby blues', or can become apparent following the first weeks after delivery and can last as long as 14 months (Goodman, 2005). Although a multitude of treatment options for PPD exist, the most common is a pharmaceutical intervention (Leitch, 2002). An analysis based on 6,421 Canadian women, who gave birth between 2005 and 2006 and were part of the Maternity Experience Survey (MES),[11] was performed in 2011 (Lanes, Kuk and Tamim, 2011). PPD symptoms were measured with the Edinburgh Postnatal Depression Scale (Dennis, 2004). The national prevalence of minor/major and major PPDs was found to be 8.5% and 8.7% respectively (total prevalence of 17.2%), and in Québec, respectively 7.7% and 9.1% (16.8%). A mother's stress level during pregnancy, the availability of support after pregnancy, and a prior diagnosis of depression were the characteristics that had the strongest statistically significant association with the development of PPDs. A prior diagnosis of depression or past use of prescription antidepressants were also associated with higher odds of experiencing both minor/major and major PPDs. Therefore, our analysis will be particularly interested in medical costs related to mental health.

Possible biases in this study are related to self-reporting, partially retrospective answers and the recruitment of participants in surveys. In several studies, the surveyed population is not representative of the female population giving birth and in some cases only mothers who returned to work after maternity leave were included in the sample. Further methodological problems relate to insufficient controls for maternal education or pre-partum health status. Some of the information is rather ancient, being collected in the late 1980s or early 1990s or 2000s (e.g. Chatterji et al.).

[11] It was designed by the Maternity Experiences Study Group of the Canadian Perinatal Surveillance System, and sponsored by the Public Health Agency of Canada. The survey was conducted by Statistics Canada between October 23, 2006 and January 31, 2007. A total of 8,542 Canadian women were selected, out of which 6,421 responded to the survey. It created a sampling period that ranged from 5 to 14 months postpartum, which ultimately garnered conservative minor/major and major PPDs prevalence rates.

The pathways from parental leave to health are diverse: mothers need time to recuperate, from fatigue and exhaustion, after pregnancy and delivery of a child; complications from pregnancy; and delivery may require them to be hospitalized before and after delivery. Additionally, the impact of leave is intensified for parents and infants who have serious medical complications and health conditions related to pregnancy and delivery. The institutional public health context is certainly an important factor that conditions maternal health pathways.

The evaluation we conduct, based on representative large random samples of women who gave birth, before and after a significant change in maternal leave policies, and who had access to complete free medical services (before and after delivery) overcome some shortcomings of data from surveys such as self- reporting or retrospective answers. Moreover, the use of administrative medical records for these mothers over a long period (7 years), as well as the PDIP records for those insured by the publicly for prescription drugs, authenticates and attests of health problems experienced by mothers.

Québec's 2006 new leave program is mainly characterized by higher replacement ratios of pre-birth earnings (for at most 1 year) compared to the federal CEIP leave program. We have found very few studies on the impact of benefit enhancements on family members. Bergemann and Riphahn (2011) and Kluve and Tamm (2013) study the labor supply effects of a recent (2007) German reform.[12] It involves a change from a means-tested maternity leave benefit system that paid a maximum of 300 Euros per month for up to 2 years to a benefit system that replaces 67 percent of pre-partum parental labor earnings (from employment or self-employment) for either the father or mother for up to 12 months postpartum. If both father and mother participate, they can receive an additional 2 months of leave or benefits, and the resulting total leave of 14 months can be freely distributed between the two parents. The transfer is topped-up at 1,800 Euros per month, and a flat rate minimum of 300 Euros per month is paid to every parent who has no previous earnings. The take up rate of the transfer has been nearly 100 per cent. They find a significant decrease in mothers' employment probability during the 12 months after giving birth, and a significant increase in mothers' employment probability after the transfer ends.

4. Empirical strategy

To evaluate the effects of the 2001 and 2006 reforms, we use the natural experiments generated by the CEIP change on January 1 2001 and QPIP plan implemented on January 1st 2006, and medical records on mothers giving birth from 1st October 2001, and 1st October 2006, to March 31st 2001, and 2006, respectively.

Our empirical strategy is based on a regression-discontinuity (RD) design with a discontinuity point on January 1st and a forcing variable which is the date of delivery. Similar identification strategies comparing

[12] Its intentions were to smooth or prevent households' earnings decline postpartum, make childbearing attractive for working women while keeping them attached to the labor market, and incentivize fathers to participate in childcare.

mothers giving birth shortly before a policy change with those giving birth shortly after have been used in earlier work, for examples by Dahl et al. (2013), Kluve and Tamm (2013), Schönberg and Ludsteck (2008), Lalive and Zweimüller (2009), Ekberg, Eriksson and Friebel (2005). Dahl et al. (2013), Guertzgen and Hank (2013), and Humlum and Vejlin (2012) all estimate the impact of extension of maternal leave duration on a diversity of outcomes using a RD design and administrative data.

To be valid the strategy requires that mothers do not time births in response to the reform at the point of discontinuity (manipulation). If they do, it is possible that treatment and "controls" even when they have the same distribution of observed characteristics, may differ in terms of unobservable health factors. In fact, for the CEIP reform the legislative process was rather hastily done and for the QIPP discussions between the governments, federal and the Province of Québec's, for the opting out arrangements lasted more than 4 years. These timelines imply that at the point in time when those children born shortly after – and before – the reforms, were conceived, none of the parents knew that by the time their child was born the new programs would be in force. Additionally, timing of conception and date of birth cannot be completely controlled by parents, in particular, as we get closer to the discontinuity point. The RD strategy assumes that the assignment of treatments and controls is random at the discontinuity point. There is no formal test for this, but the assumption implies balance between treatment and controls. We show (Table A4 below) using monthly birth registries - for which we have more socio-demographic characteristics on mothers giving birth and their child than in the RAMQ sample used for the analysis in this paper (such as age, family status, education levels, region, except family income, etc.) - that mothers in both groups are extremely similar based on a monthly comparison of mean values and also show that balance is achieved for the variables we do observe in the RAMQ sample data used in the regression analysis. However, physicians may react endogenously as to the delivery date for the period around New Year's Day. We will discuss this issue in the section on results.

Two types of estimates of the new policy on the health of mothers will be presented in Section 6. The first will be obtained with a regression analysis using as explanatory variable a treatment dummy indicating the mother gave birth in January rather than December, and control variables (the mother's age, and the region where delivery took place, a proxy for the region of residence, and total health costs before delivery). Only mothers giving birth the first week of January and last week of December will be used for these estimations, i.e. observations "close" to the point of discontinuity.

Our second strategy follows the work of Han, Todd and van der Klaauw (2001) and van der Klaauw, (1998) , who propose fitting a local polynomial regression of outcomes on the forcing variable (in our case, date of birth) on both sides of the discontinuity, and estimating the causal effect at the discontinuity point, by comparing the fitted value of the polynomials at the discontinuity point (more precisely the limit values of the expectation of outcomes as the forcing variable approaches the discontinuity point). We shall also include in our tables a "bias-corrected" estimate based on a local polynomial regression suggested by

Calonico, Cattaneo and Titiunik (CCT) (2015). Robust standard errors will also be computed by a method proposed by CCT and implemented using software written by CCT (2014).

Regression discontinuity design (RDD)

We suppose first that there is a sharp discontinuity determining the "treatment" group (mothers giving birth to a child on or after 1 January, post-policy mothers). The eligibility to the treatment is denoted by the dummy variable $T \in \{0,1\}$, so that we have $T=1$ if $Z \geq c$, and $T=0$ if $Z<c$, where c is the discontinuity point 1 January (2001 or 2006), Z is the date of birth. Suppose that X are control variables. This suggests a causal effect of the reform which can provoke a jump in Y at c. Assuming that the relation between Y and X is linear, one can estimate the treatment effect θ by fitting the linear regression:

$$Y = \alpha + T\theta + X\beta + \varepsilon \qquad (1)$$

We estimate the parameters in (1) with data from the last week in December and the first week in January without covariates and also adjusting for age and region of residence and lagged health costs. In practice, the controls do not play an important role as both treatment and control groups are in general very well balanced. The second set of estimates is based on equation (2):

$$Y=\alpha+1[t<c](g_l(c-t))+1[t\geq c](g_r(t-c)+\delta)+\varepsilon \qquad (2)$$

Where Y is an outcome variable, 1[.] is the indicator function, t is date of birth of the child, c is the threshold value (January 1), ε is an error term, and g_l and g_r are unknown functions. δ is the average treatment effect at the discontinuity. Data for all six months are used to estimate equation 2. In the first step, the bandwidth is chosen using an appropriate method. Then the RD estimate is obtained given this bandwidth.

In the simplest terms, this strategy views the estimation of treatment effects with methods based on local randomization and that limit the analysis to observations that lie within the close vicinity of the cut-point (the bandwidth), where the functional form is more likely to be close to linear. The main challenge here is selecting the right bandwidth. We estimate (2) using a local linear regression with triangular weights and an optimal bandwidth computed by the method of CCT.[13] We also estimate and present in the tables the treatment effects with a bias corrected estimator and bias-corrected robust standard errors of average treatment effects at the cut-off for a sharp RD design as suggested by CCT.

5. **Data and descriptive statistics**

Regression samples

The RAMQ extracted randomly from their Medical Registers all the medical services as provided by physicians with their billed cost spanning seven years (2 years before delivery and 5 after) provided to

[13] A STATA package written by CCT is used to compute the RD estimates as well as the Bias Corrected RD estimates with their optimal bandwidth approach.

36,000 mothers[14] giving birth from 1st October to 31st March of the next year, for 2000-2001 and 2005-2006 (18,000 mothers per grouped years). The Registers cover all medical services billed to the RAMQ by physicians (generalist or specialist) enrolled in the public system (almost all, as mentioned earlier) two years before delivery day, at delivery day, and up to five years after day of delivery. These medical acts are paid at a fee-per-service rate negotiated between physicians and the provincial government and which differs by service provided. A complementary data set includes the cost of each prescription purchased by the mothers in the first sample covered by the PDIP for the same time spans as the medical act data files.

Descriptive statistics

Figure 3 presents the number of delivering mothers by day and month for the two groups in our sample. We notice that in 2000 and 2001, births are particularly low for December 31 and New Year`s Day. This is not as clear for 2005 and 2006. However, we will produce for both groups, a RD analysis which omits births surrounding the New Year.[15]

Table A1 presents the number of mothers giving birth by month and year and eligible mothers at the time of birth registered for the public insurance prescription drug plan in our samples. We observe that mothers delivered slightly less births in November to February, for all years (Tables A1 and A3). Births are more prevalent in March for the two periods sampled. Number of births for mothers registered for the prescription drug public plan follows the same patterns as for all mothers (Tables A1 and A3). For the regression analysis, we exclude new mothers on welfare at the time of birth because they are ineligible for maternity leave benefits.[16] The bottom panel of Table A1 shows that a fairly large number of mothers (including welfare mothers) are insured by the public drug plan. Table A2 shows the eligibility status of mothers insured publicly for prescription drugs. Most of them are either in the plan because they have no private plan (they are compelled to be insured if not on a private plan, which includes public sector employees) or welfare mothers.[17] Tables A2-A3 shows the number of drugs prescribed by year, month, and eligibility status in our samples. We observe that for non-welfare mothers purchasing prescriptions drugs, on average, 20 percent of all drugs are related to central nervous system agents (mainly antipsychotic and antidepressant drugs).

Table A4 shows the total number of births in each month for years 2000, 2001, 2005, and 2006 as provided by the birth registries. There is an evident seasonality pattern of birth over the 12 months of each year: there are fewer births in the first and last two months of the year. Furthermore, there is an increase in births in years 2005 and 2006, compared to the other periods, especially in 2006, although the raises seem

[14] Excluding welfare mothers at time of delivery reduces the total samples by 4,092 mothers (see Table A3). They are identified by their status in the PDID registers.
[15] In fact when these dates are on a Saturday or Sunday (the same apply to December 25th) births are "moved" further in time.
[16] They are identified by their status from the Prescription Drug Registers.
[17] We have no information on individual purchases for those covered by private drugs insurance plans.

evenly distributed over the months. Table A5, also based on administrative birth registers, present mothers' and newborn characteristics by month and year for the months of delivery in our samples. The statistics indicate that averages of variables such as the mothers' place of birth, age groups or mean age, mother tongue, family status, levels of education, and sex of the child, birth weight (low birth incidence), mean number of gestation weeks, birth order and single birth, are extremely similar on both sides of the discontinuity

In the analysis on drug costs and consumption we ignore those drugs supplied universally and freely by the government (for STDs, tuberculosis, OCU and H1N1). Tables A2-A3 show the number of prescription drugs purchased by year, month, and type of individual (adherent or on welfare) in our samples. We also notice the higher number (in proportion) of mental health prescription drugs for welfare mothers. We will come back to this statistic in the policy discussion.

6. Estimation results

Means of outcomes variables

To distinguish between short and long-run effects and pre-existing health conditions, we constructed 6 time spans for health outcomes out of the 7 years of data for each mother which we call for the rest of the paper Periods: (1) -271 to -1 days (before delivery day); (2) delivery day 0 to 182 days after delivery (6 months); (3) day 183 to day 365 (next 6 months); (4) day 366 to 731 (year 2 after delivery); (5) day 732 or more (last 3 years of data observation); (6) day 0 or more (5 years from delivery). We will be particularly interested in the months 7 to 24 in 2000-2001 as the policy increased the benefit period from 6 to 12 months. In the next section, parametric and RD estimates of the impact of the two programs are presented for each of these six time spans.

Mothers do not receive medical services every day or month, these services are rather bunched around main events such as pregnancy (prenatal diagnostics and acts), delivery, postnatal acts, and psychiatric diagnostics. In each of our samples, when no specific act is coded during the observed time span for a specific mother, we code costs for medical services or visits as zeros, otherwise the data sets record the date, nature, institution where the visit occurred, diagnostic associated with the service, and the fee-for-service billed by physicians (generalist or specialist) and in almost all cases totally paid to the physician by the RAMQ.

Table 1 presents the mean of health outcomes variables constructed for the 6 time spans from RAMQ data sets by type and years (2000-2001 and 2005-2006). Samples consist of mothers delivering in 2000 or 2005, from 25-31 December, and 2001 or 2006, days 01-07 January (N1) and those without the "hole in the doughnut", defined as those delivering in years 2000 or 2005, from 24-30 December, and 2001 or 2006, days 4-10 January (N2). The second sample is to reduce the impact of particular decisions made by obstetricians around New Year's Day (in particular with respect to deliveries for which dates must be

chosen in advance). The first column defines the interval in number of days; the columns N1 and N2 are the number of mothers in the N1 and N2 samples respectively (the left panel concerns medical acts, the right panel, prescription drugs). The costs are the sum of all medical fees; MH indicates mental health costs; acts measures the number of acts; visits are the number of medical visits. The net costs of drugs are the public costs of prescription drugs and total cost adds the associated physician's fees; the N drugs variable is the number the drugs obtained by mothers. The last column presents the number of hospitalizations.

The medical costs for the RAMQ (invoices) were deflated by prices indexes (from Statistics Canada) of medical services and drug prices in Québec. Overall, the means are relatively small and follow a predictable pattern. The number of medical visits and fees per day assumed by the public regime are larger in the period preceding the delivery and the short period after (0 to 182), while number of visits decrease for this period as most of the costs are associated to the delivery. When comparing the means for years 2000-2001 with years 2005-2006, we observe few differences. The means related to drugs (costs, number by type and with physician's fees) are quite low.

RD Graphical analysis (Graphical Appendix)

Before presenting and discussing econometric estimates of the mean effect of the policy, we present first graphs displaying the evolution of mean outcomes before January 1st and January 1st onwards providing a picture of the RD design. The graphical analysis is based on mean costs by week (12 or 13 weeks) computed before and after 1 January for each year (graphs are shown in the Graphical Appendix)[18]. The continuous lines are computed from a locally weighted regression of the mean outcomes on time using the "lowess" procedure in software from STATA. Two separate locally weighted regressions are performed to construct the graphs. The first uses data before January 1 and the second, data from January 1 onwards. The figures are very similar to those obtained from the local linear regression procedure that provides estimates of policy effects in the next section and (these graphs are available on request). The main conclusion from these graphs is that if there are statistically significant effects as evidenced by the distance between lines at the discontinuity point they will be in general very small in percentage value. There is however evidence of a large effect for mental health costs in periods 3 (7-12 months) and period 4 in 2000-2001 (year 2), however the graph for time-span days 366-731 displays an unusual dip the last week of the year, which is difficult to explain and may simply be an outlier.

Parametric RD effects

Tables 2 to 4 present the parametric RD estimations (corresponding to equation (1)) results respectively for the medical costs, acts and visits (Table 2), net costs and number of prescribed drugs

[18] For each week, corresponding to a dot in the graph, we compute for all mothers giving birth in that week total costs for the specific period and then take the mean.

(Table 3), and number of hospitalizations with associated medical costs (Table 4). The latter are strictly physician invoices in a hospital setting. Each Table and its panels present only the estimated treatment effect and t-statistic. Panels A and B refer respectively to the years 2000-2001, and 2005-2006. Note that the sample consists of births occurring from December 25 to January 7. Almost 550 to 650 births on both side of the discontinuity are observed for both years. The number of observations for each regression varies approximately between 1,050 and 1,100. The specification has a treatment dummy, a lagged cost (total cost of medical services from 2 years before giving birth to 271 days before birth for the first time-span and two years before giving birth for the other five time-spans) and two control variables (age groups of mothers and region where the delivery took place). Sub-panel A2/B2 reports estimated coefficients when dropping days close to the discontinuity point (December 31 and January 1-3) but still using seven days of data on both sides of the discontinuity. We do this because, as can be seen in Figure 3 showing the daily number of births in our data set, there seems to be a drop in births from December 31st to January 3rd that may reflect some heterogeneity that could be related to future health costs. Table 1 presents the mean of outcome variables before policy changes by type and six time-spans, for first week of January (N1) and week with donut (N2), for years 2000-2001 and 2005-2006.

Table 2 (medical costs, acts and visits) presents six outcomes at the top of columns 1 to 6 for each time span : (1) costs for all medical acts; (2) costs of mental health acts;[19] (3) number of medical acts; (4) number of mental health acts; (5) total number of medical visits; (6) number of mental health visits. Very few of the estimates are statistically significant for the two reforms (panels A and B); and if they are, the treatment effects are small compared to observed means (see Table 1). Some of the significant estimates are rather interesting given that they are negative, are for mental health costs, and they occur in the interval of 6 to 12 months in 2001. The 2001 policy effectively increased substantially the length of leaves from 6 to 12 months. The estimates for the 2006 reform (which essentially increased benefits) do not reveal a clear pattern: the few significant coefficients suggest some marginal decreases (overall cost, acts and visits) for the year following the post-partum year (interval 13-24 months). For the 2006 enhanced new regime, results rather suggest an increase in all outcomes before delivery (for days -271 to -1), which is difficult to interpret. Also, all the results are robust to a doughnut hole removed from the data.

Table 3 follows the same pattern as Table 2 and presents estimation results for prescription drugs. The outcomes are (from column 1 to 5): (1) net costs for all prescribed acts; (2) net costs for all prescribed drugs related to mental health; (3) total costs of medical acts associated with prescribed drugs including net costs for all prescribed drugs; (4) number of all prescribed drugs; (5) number of all prescribed drugs related to mental health. Notice the much smaller samples of mothers, varying between approximately 250 and 300 observations, because the estimations are conducted only for mothers insured by the public drugs

[19] Acts are classified as of mental health nature from the diagnostic codes of physicians. A very large majority of mental acts in the data sets are provided by generalists.

prescription plan. Very few estimates are statistically significant. The estimates have a large variance because the number of observations around the discontinuity point is much smaller than in Table 2.

Finally, Table 4 presents the estimation results related to hospitalization outcomes which have the same sample sizes as in Table 2. The outcomes identified in the Table are from column 1 to 5: (1) costs of physician services during hospitalization; (2) costs of the physician services related to mental health in hospital; (3) number of medical acts in hospital; (4) number of medical acts of a mental health nature (from the diagnostics of physicians) in hospital; (5) number of all hospitalizations. The number of hospitalizations, by time-span, is very small for all years' time-span. Quite clearly, there is very little evidence of any effect of the policies on these outcomes.

Non-parametric RD effects

Tables 5 to 10 present the results from the non-parametric local linear regressions with date of birth as the forcing variable. The estimates are based on equation (2) and use all mothers in the sample to compute an optimal bandwidth. The effects for the same outcomes as in the preceding tables are estimated for the six time-spans of data.

Tables 5 and 6, cover all medical costs, acts and visits respectively for the years 2000-2001 and 2005-2005 (the number of observations for the two samples are respectively, 15,705, and 16,203). The first panel presents results obtained with the optimal bandwidth,[20] the second, with twice the optimal width.[21] Each panel presents two types of estimations: conventional and bias-corrected coefficients with robust standard errors. Interestingly, we find the same negative effects on mental health (MH) costs in months 6-12 for years 2000 and 2001, as in Table 2, and also in months 13 to 24 with the optimal bandwidth. The estimates for months 13 to 24 are similar to those in Table 2 but are significant in Table 6. The bias-corrected estimates are very similar, but the estimates for months 13 to 24 are not significant, with a slight drop in the z-statistic. When the bandwidth is doubled the estimated effects are very similar and are all significant. For the years 2005-2006 associated with the Québec reform, almost all coefficients are not significant except as in Table 2 with the 9 months interval before mothers gave birth.

Tables 7 and 8 are physician costs in a hospital setting (sample sizes are the same as for Tables 5 and 6) as well as number of hospitalizations. Tables 9 and 10 analyze prescription drug costs (sample sizes are respectively 4011 and 4206). Estimates suggest that there is very little evidence that the extended maternity leave in 2001 and the benefit boosting of 2006 reduced hospitalizations and the associated medical costs incurred because of medical interventions by physicians reimbursed by the RAMQ. The same conclusion applies to prescription drugs. This does not mean that there were no health or well-being benefits from the policy, but we almost do not find any as proxied by physician fees (and number of acts

[20] The optimal bandwidth varies from approximately 20 to 30 days in most regressions. The number of observations presented is for the sample of mothers used to find the optimal bandwidth.

[21] The estimations were also conducted with half the bandwidth. The results are very similar and not presented for space considerations, but are available from the authors.

and visits by type) and prescription drugs costs (and number by type) assumed by the public insurance regime. And if there were some effects, they would be rather small.

Therefore, our results are consistent with what is found elsewhere in the literature on this topic, that is, increasing the generosity of maternity leave parameters does not seem to have an impact on the health costs of mothers after giving birth,. The impact from the 2001 policy may reduce mothers' mental health costs, slightly, when they are returning to work. The main reason for these results is probably that, in general, mothers are young and generally in very good health. Also, it may be that the effects on health are non-linear with stronger effects obtained when comparing no leave with a few months of leave, but after a certain amount more leave could have a marginal effect.

7. Benefits and social costs of the leave program changes

Social benefits

What are the benefits of the program compared to health costs incurred by the public health system for new mothers, low-income or welfare mothers or those with unpaid maternity leave? Hanratty and Tracinski's (2009) calculations indicate that the 2001 expansion impacts on transfer income and leave time were likely smaller for low-wage, or low income women than for women in the middle of the wage and income distribution (with declining impacts for high wage women, due to the $413 cap on leave payments). They show that the paid leave expansions were associated with a relative increase in family leave payments of $2,700 per year, with much larger net gains for mothers with higher socioeconomic traits, defined by marital status, non-wage income, and maternal education (impact of $3,200 for higher skilled women).

From 1996 to 2006, the parameters of the federal CEIP were 'frozen'. Since these benefits replace only a proportion of insurable earnings—up to 75% in Quebec (since 2006) and 55% outside Québec - most families experience a reduction in household income during the work absence. Hence, Québec's leave program expansion has offered a better compensation for time off-work for a higher proportion of new mothers (see Table 11B). However, high earner mothers have made the most of Québec's leave program expansion (jump of $20,000 in insurable earnings and replacement rates). To compensate for earnings lost by employees on leave, some employers provide mothers with a Supplemental Unemployment Benefit (SUB), also known as a top-up. One in five mothers has an EI/QPIP employer top-up benefit. In 2001 (2005), 24 (32) percent of Québec's mothers with CEIP benefits had a SUB, for an average period of 19 (32) weeks.

When discussing the estimation results, we did not document the total costs of medical acts or prescription drugs compared with the leave programs monetary benefits for mothers (and their family). Table 11A presents summary statistics on total costs, number of medical acts and prescription drugs, and number of mothers and births by month and year. The columns identify 6 groups of mothers who have

given birth within the three selected months chosen for years 1998-99, 2000-01 and 2001-05. The years 1998-99 are placebo years with no program changes.

In the first panel, lines 1 and 2 indicate the total number of medical acts and their nominal costs over the cumulative 7 years' time-span for all the three months for which we have information from the files. Lines 3 and 5 present the mean cost per act and per mother (number of mothers are shown on line 4). Total costs for the three months ending a year or beginning a year are respectively 24.4 and 33.2 million $ in 1998 and 2006; mean cost per act are $35.3 and $43.9 for same years, while cost per mother are $2,754 and $3,571. The raise in those costs are evidently related to the number of mothers and some progression of the fees paid to doctors. The average physician cost per mother having given birth over a 7 year period is small: $3,600 in year 2005 or 2006. The panel on prescription drugs (lines 6-8) shows also very low net costs per eligible mother over all the years ($51 in 2006). We have no reason to think that the medical costs attached to delivering mothers in the October-December or January-March months differ from the July-September or April-June months. Taking into account the total births on a yearly basis (last panel, lines 9 and 10), the costs identified in the preceding panels should be multiplied by a factor between 8.6 and 8.9 (line 10) to obtain annual medical (drugs) costs. The overall evidence tells that both expansions had very marginal impacts on health care costs (medical and drugs). Moreover these costs are modest.

Women bearing a child must take some time off work during (at least at the end of) pregnancy and the first months of their child's infancy. A leave policy which ensures job security with minimum mandated number of paid weeks leave is likely to reduce stress during and after the pregnancy with crucial impacts on health, family's material resources available, and overall well-being. All these elements may also have effects on children's outcomes, although the evidence is very mixed (see Baker and Milligan (2010, 2015) for Canadian results). The federal reform of 2001 can be credited with more substantial effects on time off-work and with a new child (Figures 1 and 2). Québec's new 2006 regime appears to have no effects on these outcomes.

Financial costs and tax burden

Our results as well as our reading of the evidence on the impact of more generous maternity or parental leave on outcomes that may have some societal value lead us to conclude that the enhancements to the parental leave programs in Québec and Canada will not produce a high return for Québec's economy and increase inequity between high income and low income families in particular very low income families. Although, little has been found on the impact of this policy on employment, participation rates for mothers with young children in Québec is amongst the highest in the world, such that those who are not working are very low skill or with strong preferences for child rearing done strictly at home, for example for religious reasons.

Cost and benefit issues surrounding parental leave extensions are rarely addressed in studies on the impact of leave policies (except briefly by Rossin, 2011; and, more extensively by Dahl et al. 2013). We

pursue this task in this section. It is possible that longer paid leaves have increased disparities in early childhood health and between eligible and ineligible mothers from different socio-economic backgrounds. With a 100% income replacement ratio and very high insurable earnings (up to $75,000 in 2010), Dahl et al. (2013) qualify the recent expansions of the Norwegian program as conducive to pure leisure transfers from middle income and ineligible families to upper income families with no other positive and distinctive social outcomes. We believe this may also be particularly true of the 2006 Québec policy. After a presentation of aggregate numbers on leave policies in Canada we will return to this crucial point.

Table 11B presents a summary of aggregate financial statistics on leave programs (in millions of nominal dollars), number of births and coverage, for selected years (four years of the federal program from 1998 to 2005 and eight years since the implementation of Québec's regime from 2006 to 2013) in the Province of Québec. The cost of the Canadian federal leave programs has soared over time (contributing factors are higher incomes for both mothers and fathers and the increases in labor force participation and education of would-be mothers). The costs over the years of the QPIP acutely illustrate this point.

In 2005 there were 76,341 births compared to 81,962 in 2006 (a 7.4 percent increase). In the first year of the new program (2006), 1,176 million $ of benefits (maternity, parental, adoption, and supplements) were paid to the 2006 cohort of new mothers compared to 722 million of benefits laid out by the federal CEIP a year earlier (2005), a 163% increase. The 2006 payroll taxes (from employees and employers and now self-employed workers) amounted to 1,184 million $ and seemed to have almost balances and the operating costs of the program. But two factors darken the financial picture. First, the devolution of the leave program from the federal government to the Government of Québec resulted in a 346.6 million $ loan from the federal government[22] with reimbursements starting in 2015. Second, premium rates fixed by the Government of Québec were much higher than the notional rates calculated by the federal government as a rebate for workers and employers for not contributing to the federal EI leave program.[23]

In the following years, the number of births increased significantly from 2005 to 2008 with a plateau of around 88,000 births since 2008.[24] But, abstracting from births (or adoptions which are decreasing each year), albeit that the coverage rate of new mothers who gave birth has jumped in 2006 to almost 80% compared to 66% in 2005 because of less strict eligibility rules**,** after the jump from 2005 to 2006, the number of beneficiaries has not changed much.

[22] Benefits paid according to the federal parameters of 2005 to mothers or parents who were still eligible to benefits in 2006 (156.6 million $) and 200 million $ to implement the new regime.

[23] For wage earners and employers the increase in premium was 22%. The notional premiums were generous for Québec because Québec's wage earnings are on average lower than in the rest of Canada (the federal EI regime has always had a large degree of interprovincial financing).

[24] The fertility rate has increased before the new regime from 1.45 in 2000 to 1.73 in 2009 and fell back to 1.65 in 2013. Over the years the fertility pattern in the Rest of Canada is rather similar. It is therefore not clear that the regime influenced fertility since its implementation in 2006.

But beneficiaries' earnings increased and the program experienced many years with a shortfall of revenues leading to yearly increases in a specific tax dedicated to finance the program. In 2013, 1,900 million $ were paid in benefits (a 160 percent rise in 7 years from 2006) with administrative costs of 39 million $ or 2 percent), and payroll taxes revenues of 2,018 million $ (a 170 percent rise from 2006). Moreover, the regime had a cumulated deficit of 448 million $ (part of Québec's national debt) which the QPIP plans to repay beginning with year 2015.

The financial problem of the regime is explained by significant rises each year of insurable earnings and the premium: for employees the latter rises from 0.416/$100 in 2006 to 0.559/$100 in 2013, for employers from 0.583/$100 to 0.782/$100, and for self-employed from 0$ in 2005 to 0.993/$100 in 2013. In public finance, payroll taxes are considered to produce a low excess burden (the distortionary cost or deadweight loss of taxation, generates economic losses that society suffers as the result of taxes or subsidies. Parental leave benefits are subsidies to spend more time with your child). However, Québec is the province with the largest public debt in Canada and with the highest average rate of income taxes, payroll taxes, and consumption tax rates. Economic theory posits that distortions change the amount and type of economic behavior from that which would occur in a free market without the tax. Excess burdens can be measured using the average cost of funds or the marginal cost of funds (MCF).[25] Considering the QPIP debt level, it is not clear that premiums will not be raised in the future contributing to larger economic losses.

Inequities

Table 12 presents some selected characteristics of mothers with a child aged 0 to 12 months in relation to maternity leaves since the year 2000. We observe over the years that mothers from households with higher income (panel 1) are overrepresented among all new mothers who receive benefits. Mothers with benefits from maternal or parental leave (or both) are much more educated (panel 2), born in Canada (panel 3), hold higher levels of occupation (panel 4), and work more in industry groups associated to public services (panel 5) such as education, health, social services and government. A third of new mothers with benefits also receive top-ups (a benefit supplement) from their employer (panel 6); among those mothers, approximately 20% of the supplement is paid for more than 18 weeks. The average top-up payment was $320 per week. In 2006, the average duration of a top-up was reduced to 17 weeks and average payments dropped to $260 per week. These changes are obviously related to the higher benefits of the new program. The personal and job characteristics of mothers with an employer top-up to their maternity or parental benefits were positively associated with education (university degree), union status, job tenure, size of the company, sector (public) and hourly earnings (Marshall, 2010). In Québec, most mothers on parental leave and employed in the public sectors have a SUB for significantly more weeks

[25] Marginal cost of funds in Québec has been recently estimated by Wen, Dahlby, and Ferede (2014). The marginal cost of payroll taxes is low at 1.11 (2009 estimate).

and were on leave for a longer period compared to mothers employed in the private sector. Almost all mothers with a top-up returned to the same employer (96% of mothers according to the 2010 study of Marshall, based on the Canadian Employment Insurance Coverage Survey). On the one hand, employer's top-ups are a strong incentive for women to not only return to the paid workforce, but also to stay with the same employer. On the other hand, the indication that employer top-ups are a common and substantial benefit mainly for public sector employees raises the question of the equity of the program. Also, employers who topped up before the new policy can now reduce the top-ups as benefit levels have substantially increased. In some sense, part of their top-ups is now paid by other employers and employees, providing an interesting windfall for such employers.

Clearly, the Canadian leave programs benefit more upper income families with a new child. Québec's program with its relaxed eligibility and much higher replacement rates has likely accentuated the trends observed in the mid-2000s: in the early 2010s almost 50% of new mothers are a university graduate, 37% are in the higher household income category (60,000$ or more), more than 50% have an occupation in applied or social sciences and work in the extended public sector. Since the maternity leave transfers are financed out of payroll taxes on earnings (wages and from self-employment) of all citizens, an enhanced maternity leave program leads to redistribution effects among socio-economic families, which in our opinion is a neglected issue in research assessing the overall impact of this policy in developed societies. Therefore, a substantial share of the new benefits went to higher income families who in several cases saw their benefits topped-up by their employer.

Moreover, leave policies have differential impacts on mothers (and likely their children) from different socio-economic backgrounds. As Table 11A shows, not all new mothers may be able to take advantage of paid leave (45% in 2001 and 17% in 2013). Two reasons explain this: some mothers have no insurable employment (having not worked or are self-employed before 2006), and mothers who did not claim or receive maternity or parental benefits (see Figure 1). Clearly, Québec's program has enrolled more new mothers with looser regulations on accessibility and coverage (self-employed, very low earnings of $2,000/year). But, non-eligibility of mothers for benefits have different implications for the welfare of mothers and their child depending on whether they live in low income and low-educated one-parent households or high-income and high-educated two-parent households, as these families likely face different constraints.

8. Summary and conclusion

We use a RD approach to estimate the impact on medical and prescription drug costs of the change in two parental leave programs in Canada, the first basically increasing the time mothers stay home with the child after birth, the second increasing family income and also increasing the time father's may spend at home with the newborn (three to five weeks). We find little evidence that these policies had a strong

impact on such costs. This does not mean of course that the policy did not increase the well-being of families; it simply says that the government will not observe any pecuniary returns from decreased health costs because of these policies. Our results are rather similar to a host of studies on enhancements of parental leave policy which find little societal benefits of these policies. It is possible that these societal benefits are much greater when enhancements are implemented in a context where countries have no parental leave policies or very stingy policies. Therefore, it is important to consider other aspects of the impact of the policy such as distributional aspects. Given the high costs of these policies, in particular the new 2006 Quebec policy, governments should reconsider certain parameters to make neo-natal policies more efficient and less inequitable.

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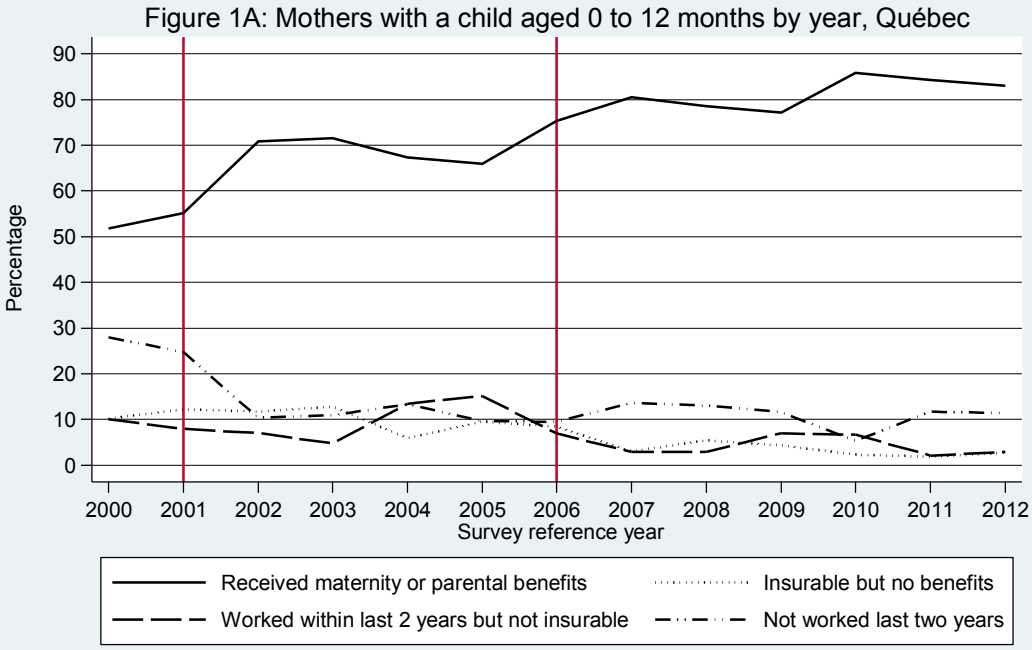
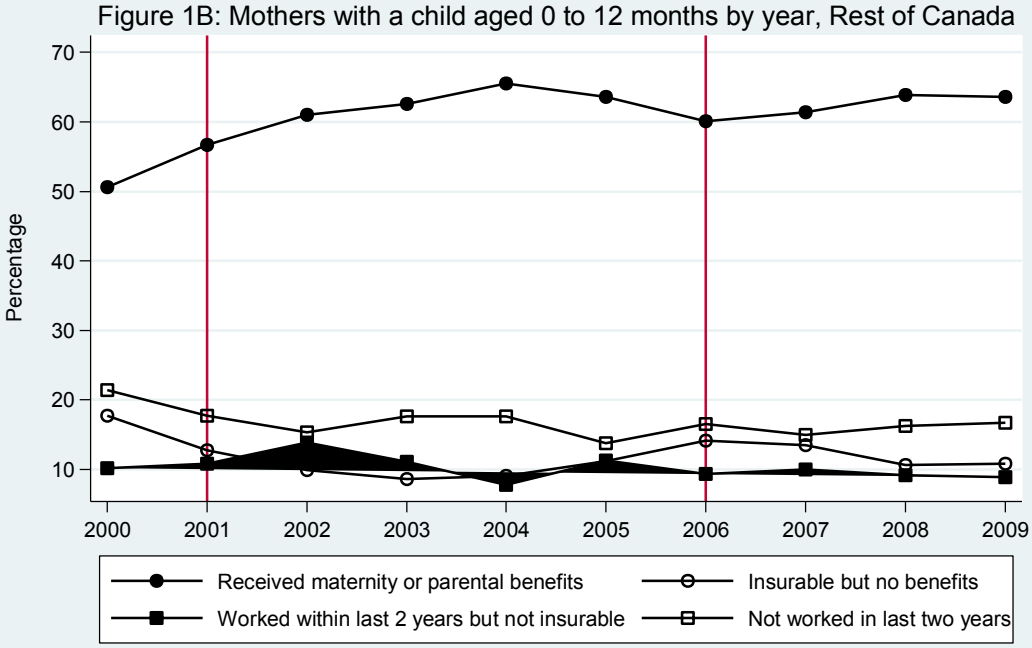
Figure 1: Percentage of Mothers with Maternity or Parental Benefits, Québec and Rest of Canada by year, 2000 to 2012

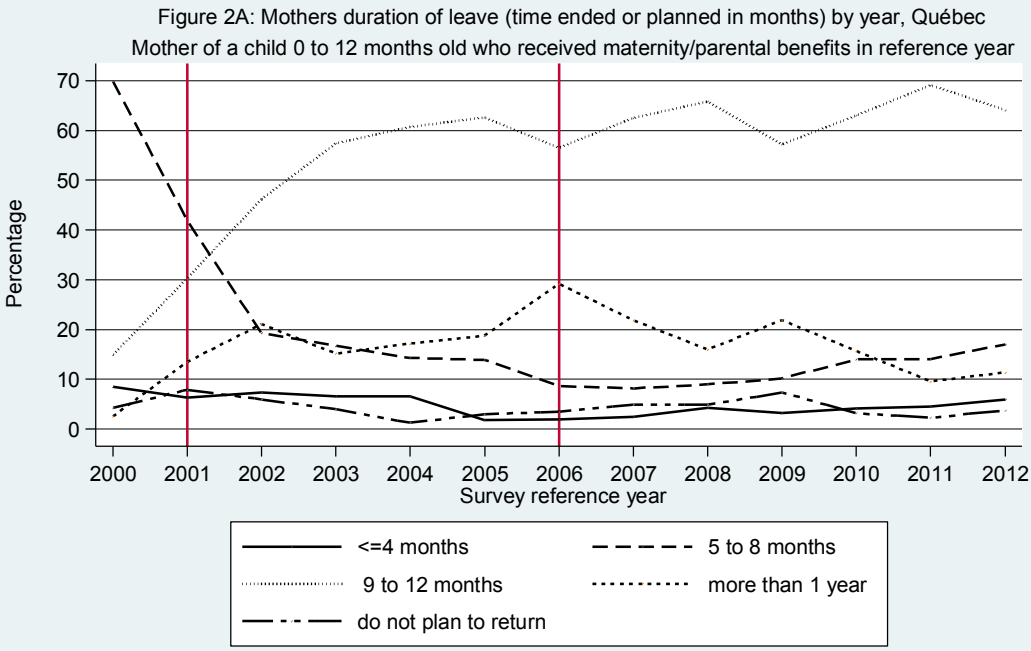


Authors' calculation from Employment Insurance Coverage Survey weighted micro-data.
Reference lines indicate policy changes



Reference lines indicate policy changes
Authors' calculation from Employment Insurance coverage Survey weighted micro-data

Figure 2: Duration of Leave by Mothers with a Child 0-12 Months who received Maternity or Parental Benefits, Québec and Rest of Canada by year, 2000 to 2012



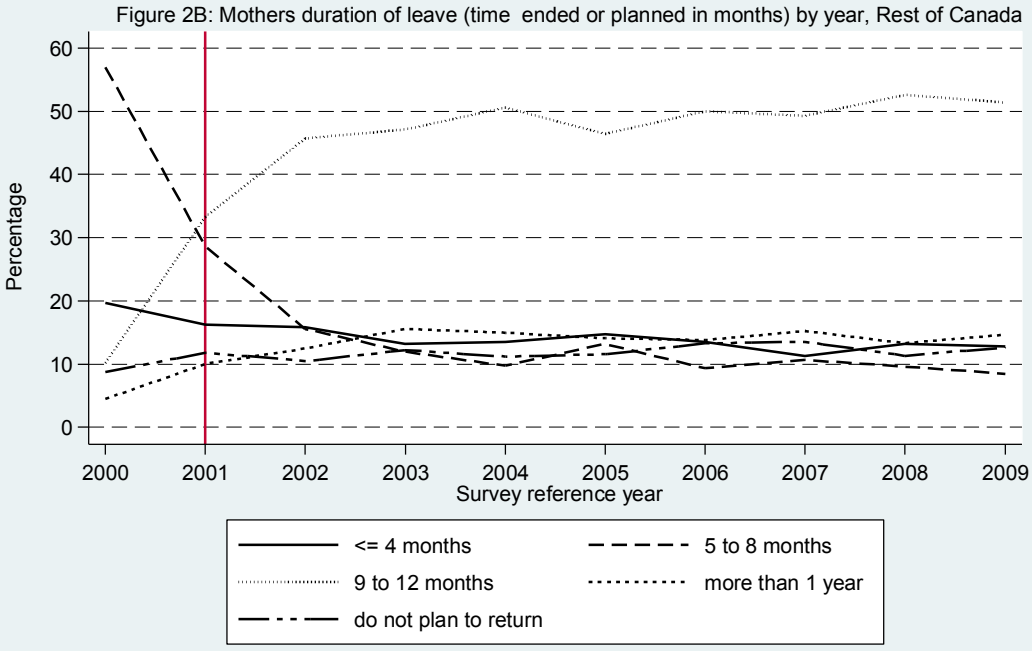
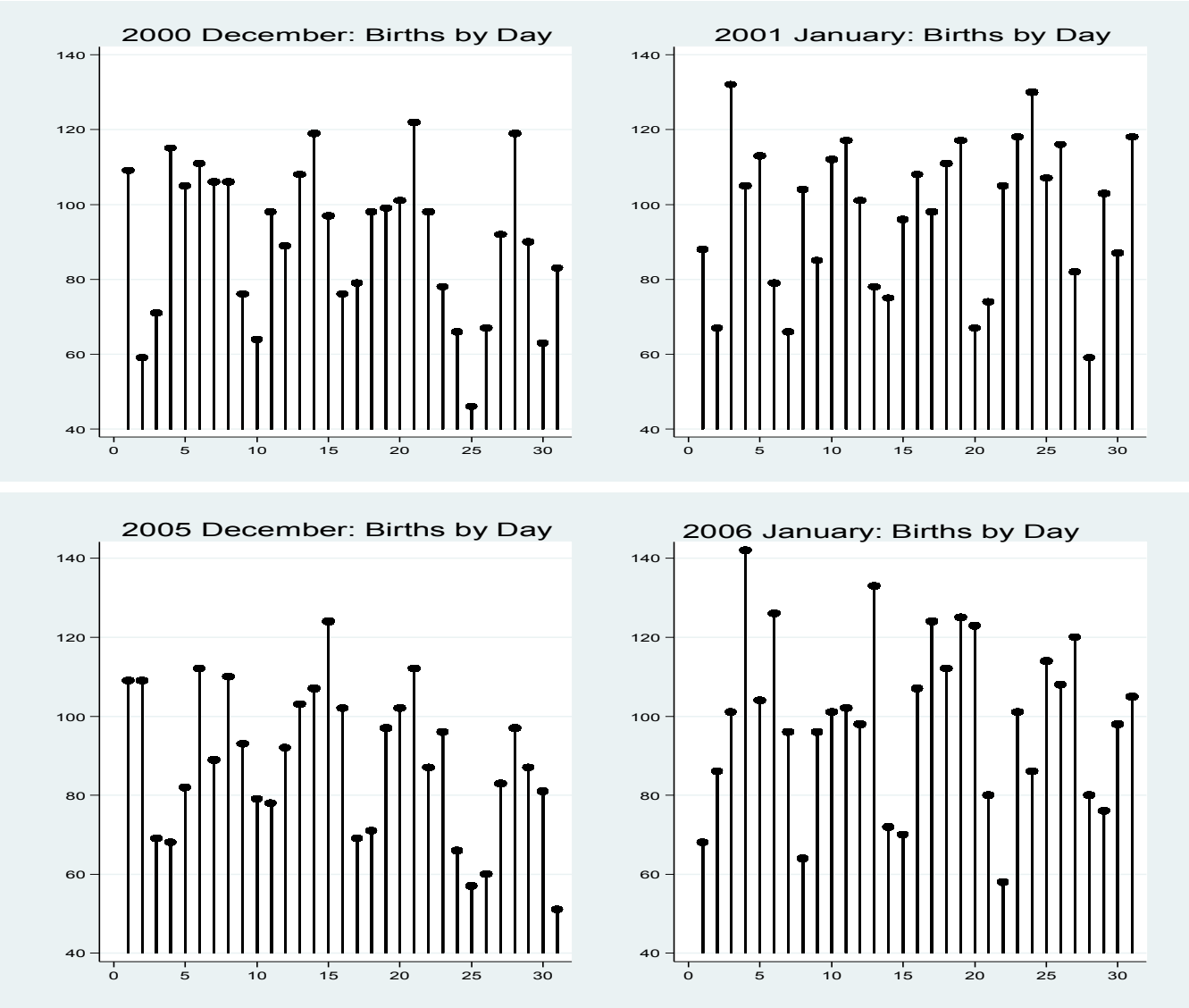


Figure 3: Births by Day and Month, samples 2000-2001, and 2005-2006



Source: Authors' calculation from RAMQ data sets.

Box 1: Canada Employment Insurance Parental benefits (CEIP) compared over years and Québec Parental Insurance Plan benefits (QPIP) 2006

	CEIP 2000	CEIP 2001	Québec basic plan 2006	Québec special plan 2006
Coverage	Canadian new parents	Canadian new parents	Québec' s new parents	Québec' s new parents
Eligibility	700 hours of "insurable employment" over 1 year	600 hours of "insurable employment" over 1 year	$2000 earnings	$2000 earnings
Basic replacement rate Low-income replacement rate	55 percent 65 percent(<$25,921)	55 percent 80 percent(<$25,921)	70/55 percent 80 percent <$25,921)	75 percent 80 percent<$25,921
Maximum insurable earnings Duration	$39,000 Max. of $412/week 15 weeks maternity 10 weeks parental	$39,000 Max. of $412/week 15 weeks maternity 35 weeks parental	$57,000** Max of $767/week 70%/25 weeks + 55%/25 weeks 18 weeks maternity 32 weeks parental 5 weeks, father only	$57,000** Max of $822/week 75 percent: 15 weeks maternity 25 weeks parental 3 weeks, father only
Self-employed workers Waiting period	Not covered 2 weeks	Not covered 1 week if parent sharing	Covered None	Covered None
Mandated Parental Leave by jurisdiction (weeks)	Québec (70); Other provinces (17-35)	Québec (70); Other provinces (52)	Québec (70)	Québec (70)

*From 1996 to 2006. In 2007: $40,000; in 2013: $47,400. ** Insurable earnings have increased each year and are $67,500 in 2013. # Total family income cut-off for eligibility to a low-income replacement rate has not changed over the years.

Table 1: Mean of outcome variables by type and period, for the N1 and N2 samples, 2000-2001 and 2005-2006

Interval in days	N1 N2	Cost $	Cost $ MH	Acts	Acts MH	Visits	Visits MH	N1 N2	Net cost of drugs	Drugs MH	Total cost	N drugs	N drugs MH	Hospi-talization
2000-2001														
-271 to -1	1,067	487	21	4	0,1	17	0.1	283	70	2	531	2.2	0.14	0.6
	1,047	484	21	5	0,2	17	0.1	291	73	2	550	2.2	0.13	0.6
0 to 182	1,067	838	7	9	0,3	6	0.2	283	35	8	876	2.6	0.54	1.0
	1,047	806	7	9	0,3	6	0.2	291	32	9	873	2.5	0.57	1.0
183 to 365	1,067	89	3	6	0,2	2	0.1	283	46	9	155	2.8	0.43	0.1
	1,047	87	3	5	0,2	2	0.1	291	44	9	142	2.7	0.42	0.1
366 to 731	1,067	299	9	12	0,4	7	0.3	283	79	24	371	4.3	1.0	0.3
	1,047	306	9	12	0,4	7	0.3	291	86	29	389	4.6	1.2	0.3
732 to 1825	1,067	918	26	49	1,7	20	1.1	283	228	81	1220	12	3.3	0.7
	1,047	923	26	49	1,7	20	1.1	291	240	97	1227	12	3.8	0.6
0 to 1825	1,067	2145	45	75	2,5	35	1.7	283	388	122	2633	22	5.3	2.2
	1,047	2121	45	76	2,6	35	1.7	291	401	144	2620	22	6.0	2.2
2005-2006														
-271 to -1	1,119	460	3	21	0.1	16	0.06	253	85	11	540	2.5	0.34	0.6
	1,127	462	3	21	0.1	16	0.06	268	102	10	558	2.5	0.33	0.7
0 to 182	1,119	847	4	7	0.1	5	0.07	253	55	8	922	3.1	0.49	1.1
	1,127	839	3	7	0.1	5	0.06	268	62	9	937	2.2	0.54	1.0
183 to 365	1,119	86	5	3	0.2	2	0.13	253	30	5	105	1.9	0.22	0.1
	1,127	95	5	3	0.2	3	0.12	268	80	4	168	1.9	0.20	0.1
366 to 731	1,119	328	9	10	0.4	7	0.27	253	61	7	354	3.0	0.42	0.3
	1,127	318	10	10	0.4	7	0.28	268	304	8	614	3.4	0.48	0.3
732 to 1825	1,119	978	57	28	2.0	20	1.2	253	269	18	1318	8.5	1.4	0.8
	1,127	946	51	27	1.8	19	1.1	268	433	21	1418	8.5	1.5	0.7
0 to 1825	1,119	2241	74	49	2.7	35	1.7	253	425	38	2700	15.6	2.5	2.3
	1,127	2197	69	48	2.5	34	1.5	268	880	43	3138	16.0	2.7	2.3

Notes: See Tables 2 and 3 for definitions of variables.

N1 is defined, days 25-31 in December, and days 1-7 in January; N2 is week with a donut hole, days 24-30 in December, and days 4-10 in January.

Table 2: Parametric regression discontinuity results for costs, acts and visits of physicians by period and specification, 2000-2001 and 2005-2006

Period days		Parameters	Cost $	Cost-MH $	Acts	Act-MH	Visits	Visit-MH
A1. Delivering mothers 2000 (25-31 Dec.) and 2001 (01-07 Jan.) N=1,067								
-271 to -1	Treat + Lag + Control	Coef	12,46	-1,31	-0,19	-0,02	0,12	-0,02
	Treat + Lag + Control	t-stat	0,77	-0,7	-0,3	-0,27	0,26	-0,61
0 to 182	Treat + Lag + Control	Coef	-15,15	-11,01	-0,57	-0,28	-0,45	-0,19
	Treat + Lag + Control	t-stat	-0,67	-1,55	-1,44	-1,42	-1,6	-1,51
183 to 365	Treat + Lag + Control	Coef	-1,25	-3,75**	-0,22	-0,11*	-0,06	-0,09**
	Treat + Lag + Control	t-stat	-0,14	-2,01	-0,77	-1,9	-0,3	-2,16
366 to 731	Treat + Lag + Control	Coef	-42,67*	-4,53	-1,03*	-0,15	-0,57	-0,1
	Treat + Lag + Control	t-stat	-1,71	-1,55	-1,7	-1,55	-1,29	-1,34
732 to 1825	Treat + Lag + Control	Coef	-20,02	9,02	0,56	0,33	0,37	0,11
	Treat + Lag + Control	t-stat	-0,4	0,8	0,44	0,87	0,4	0,51
1 to 1825	Treat + Lag + Control	Coef	-79,09	-10,28	-1,26	-0,22	-0,72	-0,26
	Treat + Lag + Control	t-stat	-1,15	-0,67	-0,72	-0,45	-0,54	-0,84
A2. With donut RD dropping 2000 (24-30 Dec.) and 2001 (4-10 Jan.) N=1,047								
-271 to -1	Treat + Lag + Control	Coef	0,39	-1,84	-0,57	-0,05	-0,06	-0,03
	Treat + Lag + Control	t-stat	0,02	-1,09	-0,63	-0,94	-0,09	-0,99
0 to 182	Treat + Lag + Control	Coef	-46,6**	-11,3	-0,66	-0,28	-0,61**	-0,19
	Treat + Lag + Control	t-stat	-2,12	-1,55	-1,61	-1,37	-2,19	-1,54
183 to 365	Treat + Lag + Control	Coef	4,95	-4,21**	-0,16	-0,14***	-0,04	-0,09**
	Treat + Lag + Control	t-stat	0,51	-2,36	-0,52	-2,59	-0,18	-2,45
366 to 731	Treat + Lag + Control	Coef	-27,65	-3,8	-0,68	-0,12	-0,28	-0,08
	Treat + Lag + Control	t-stat	-1,09	-1,2	-1,07	-0,97	-0,61	-0,99
732 to 1825	Treat + Lag + Control	Coef	21,16	10,68	1,09	0,4	0,88	0,22
	Treat + Lag + Control	t-stat	0,39	1,01	0,79	1,11	0,87	0,96
1 to 1825	Treat + Lag + Control	Coef	-48,18	-8,64	-0,4	-0,13	-0,06	-0,15
	Treat + Lag + Control	t-stat	-0,66	-0,55	-0,21	-0,25	-0,04	-0,47
B1. Delivering mothers 2005 (25-31 Dec.) and 2006 (01-07 Jan.) N=1,119								
-271 to -1	Treat + Lag + Control	Coef	47.7***	3.41*	1.74**	0.13*	1.31***	0.08**
	Treat + Lag + Control	t-stat	2.85	1.82	2.57	1.82	2.90	2.05
0 to 182	Treat + Lag + Control	Coef	5.84	3.23	0.38	0.16*	0.18	0.10**
	Treat + Lag + Control	t-stat	0.24	1.51	1.08	1.91	0.76	2.04
183 to 365	Treat + Lag + Control	Coef	-5.49	0.42	-0.22	0.02	-0.12	0.01
	Treat + Lag + Control	t-stat	-0.49	0.16	-0.69	0.19	-0.55	0.21
366 to 731	Treat + Lag + Control	Coef	-42.77*	2.13	-1.37*	0.03	-0.83*	0.00
	Treat + Lag + Control	t-stat	-1.64	0.89	-1.93	0.34	-1.84	0.00
732 to 1825	Treat + Lag + Control	Coef	67.84	3.26	0.98	0.06	0.58	0.06
	Treat + Lag + Control	t-stat	1.10	0.23	0.61	0.14	0.55	0.23
1 to 1825	Treat + Lag + Control	Coef	25.41	9.04	-0.23	0.27	-0.18	0.17
	Treat + Lag + Control	t-stat	0.32	0.56	-0.11	0.49	-0.13	0.50
B2. With donut RD dropping 2005 (24-30 Dec.) and 2006 (4-10 Jan.) N=1,127								
-271 to -1	Treat + Lag + Control	Coef	48.7***	3.07*	1.77**	0.11*	1.41***	0.08**
	Treat + Lag + Control	t-stat	2.81	1.84	2.51	1.80	2.84	2.19
0 to 182	Treat + Lag + Control	Coef	-17.08	4.19	0.88**	0.23*	0.54*	0.13*
	Treat + Lag + Control	t-stat	-0.67	1.52	2.01	1.90	1.68	1.87
183 to 365	Treat + Lag + Control	Coef	-3.98	0.90	-0.13	0.04	0.00	0.02
	Treat + Lag + Control	t-stat	-0.38	0.34	-0.40	0.43	0.01	0.34
366 to 731	Treat + Lag + Control	Coef	-25.97	3.34	-0.85	0.10	-0.47	0.02
	Treat + Lag + Control	t-stat	-0.99	1.33	-1.18	0.99	-1.01	0.29
732 to 1825	Treat + Lag + Control	Coef	107.2*	2.58	2.06	0.03	1.39	0.06
	Treat + Lag + Control	t-stat	1.70	0.18	1.24	0.07	1.27	0.22
1 to 1825	Treat + Lag + Control	Coef	60.11	11.01	1.95	0.40	1.46	0.23
	Treat + Lag + Control	t-stat	0.74	0.67	0.91	0.70	1.00	0.64

Notes: Costs are the sum of medical fees; MH indicates mental health; Treat is a dummy variable indicating that the observation is from the first week of January; Lag measures costs before day -271 in period 1 and 2 years before giving birth in periods 2 (0 to 182) to 6 (1 to 1825); Controls are dummy variables for five age groups of mothers and 16 administrative regions. Statistical significance: *=10%, **=5%; ***=1%.

Table 3: Parametric regression discontinuity results for net public costs of prescription drugs (all and type) and associated physicians fees, by period and specification, 2000-2001 and 2005-2006

Period in days	Specification	Para-meter	Net Cost Drug	Net Cost Drug-MH	Total Cost	Number Drug	Number Drug-MH
A1. Delivering mothers 2000 (25-31 Dec.) and 2001 (01-07 Jan.) N=283							
-271 to -1	Treat + Lag + Control	Coef	-29.00	0.53	-2.75	-0.45	-0.02
	Treat + Lag + Control	t-stat	-0.86	0.30	-0.05	-0.90	-0.27
0 to 182	Treat + Lag + Control	Coef	2.15	-1.06	-29.26	-0.11	-0.11
	Treat + Lag + Control	t-stat	0.26	-0.25	-0.61	-0.27	-0.43
183 to 365	Treat + Lag + Control	Coef	-5.21	-3.74	-9.00	-0.45	-0.09
	Treat + Lag + Control	t-stat	-0.40	-0.92	-0.30	-0.93	-0.55
366 to 731	Treat + Lag + Control	Coef	13.77	-4.30	11.24	0.74	-0.25
	Treat + Lag + Control	t-stat	0.63	-0.39	0.19	0.90	-0.79
732 to 1825	Treat + Lag + Control	Coef	264.3	-13.36	138.99	1.37	-1.13
	Treat + Lag + Control	t-stat	0.93	-0.22	0.44	0.67	-1.11
1 to 1825	Treat + Lag + Control	Coef	275.0	-22.46	111.9	1.55	-1.58
	Treat + Lag + Control	t-stat	0.93	-0.33	0.32	0.51	-1.15
A2. With donut RD dropping 2000 (24-30 Dec.) and 2001 (4-10 Jan) n=291							
-271 to -1	Treat + Lag + Control	Coef	-30.02	0.42	-58.38	-0.34	-0.01
	Treat + Lag + Control	t-stat	-0.90	0.24	-1.14	-0.67	-0.11
0 to 182	Treat + Lag + Control	Coef	2.51	-0.01	-66.42	0.09	0.00
	Treat + Lag + Control	t-stat	0.31	0.00	-1.41	0.20	-0.01
183 to 365	Treat + Lag + Control	Coef	-7.00	-4.26	-12.34	-0.39	-0.11
	Treat + Lag + Control	t-stat	-0.55	-1.07	-0.43	-0.82	-0.67
366 to 731	Treat + Lag + Control	Coef	-0.94	-10.23	-11.22	0.43	-0.31
	Treat + Lag + Control	t-stat	-0.04	-0.97	-0.19	0.50	-0.91
732 to 1825	Treat + Lag + Control	Coef	273.1	-16.80	126.8	0.57	-1.14
	Treat + Lag + Control	t-stat	0.97	-0.26	0.40	0.26	-0.96
1 to 1825	Treat + Lag + Control	Coef	267.7	-31.30	36.80	0.71	-1.57
	Treat + Lag + Control	t-stat	0.91	-0.45	0.11	0.22	-1.02
B1. Delivering mothers 2005 (25-31 Dec.) and 2006 (01-07 Jan.) N=253							
-271 to -1	Treat + Lag + Control	Coef	-28.75	-6.62	18.43	-0.21	-0.08
	Treat + Lag + Control	t-stat	-1.28	-0.80	0.42	-0.39	-0.41
0 to 182	Treat + Lag + Control	Coef	6.95	2.95	54.71	0.46	0.12
	Treat + Lag + Control	t-stat	0.57	0.53	1.12	1.22	0.56
183 to 365	Treat + Lag + Control	Coef	111.2	6.21	121.7	0.65	0.43*
	Treat + Lag + Control	t-stat	1.19	1.45	1.22	1.28	1.75
366 to 731	Treat + Lag + Control	Coef	165.3	15.26**	149.2	1.86**	0.90***
	Treat + Lag + Control	t-stat	1.29	2.23	1.05	2.23	2.83
732 to 1825	Treat + Lag + Control	Coef	125.1	59.9***	196.3	5.04**	3.17***
	Treat + Lag + Control	t-stat	0.65	2.64	0.72	2.08	3.23
1 to 1825	Treat + Lag + Control	Coef	408.5	84.3***	521.9	8.00**	4.62***
	Treat + Lag + Control	t-stat	1.06	2.82	1.15	2.28	3.24
B2. With donut RD dropping 2000 (24-30 Dec.) and 2006 (4-10 Jan.) N=268							
-271 to -1	Treat + Lag + Control	Coef	1.67	5.26	53.92	0.41	0.17
	Treat + Lag + Control	t-stat	0.08	0.65	1.23	0.75	0.93
0 to 182	Treat + Lag + Control	Coef	14.75	7.34	5.22	0.77*	0.33
	Treat + Lag + Control	t-stat	1.21	1.36	0.11	1.95	1.53
183 to 365	Treat + Lag + Control	Coef	98.10	4.68	115.8	0.56	0.33
	Treat + Lag + Control	t-stat	1.11	1.31	1.22	1.19	1.44
366 to 731	Treat + Lag + Control	Coef	45.02	8.82	65.4	0.71	0.63**
	Treat + Lag + Control	t-stat	0.26	1.57	0.36	0.92	2.27
732 to 1825	Treat + Lag + Control	Coef	33.09	47.3**	94.5	3.34	2.39**
	Treat + Lag + Control	t-stat	0.17	2.28	0.37	1.58	2.87
1 to 1825	Treat + Lag + Control	Coef	190.9	68.2***	281.0	5.38*	3.67**
	Treat + Lag + Control	t-stat	0.46	2.68	0.60	1.77	3.09

Notes: Net Cost Drug are drug prices less patient contributions; MH indicates mental health; Total Cost are the sum of drug and physician fees; Treat is a dummy variable indicating that the observation is from the first week of January; Lag measures costs before day -271 in period 1 and 2 years before giving birth in periods 2 (0 to 182) to 6 (1 to 1825); Controls are dummy variables for five age groups of mothers and 16 administrative regions. Statistical significance: *=10%. **=5%; ***=1%.

Table 4: Parametric regression discontinuity results for costs and acts (all and type) associated with hospitalization by period and specification, 2000-2001 and 2005-2006

Period in days	Specification	Par.	Cost $	Cost-MH $	Acts	Act-MH	Hospitalization
A1. Delivering mothers 2000 (25-31 Dec.) and 2001 (01-07 Jan.) N=1,067							
-271 to -1	Treat + Lag + Control	Coef	9.29	-0.52	0.36	-0.02	0.01
	Treat + Lag + Control	t-stat	1.01	-1.25	1.04	-1.25	0.20
0 to 182	Treat + Lag + Control	Coef	-14.56	-4.48	-0.32	-0.17	-0.01
	Treat + Lag + Control	t-stat	-0.73	-1.35	-1.29	-1.24	-0.57
183 to 365	Treat + Lag + Control	Coef	2.63	-0.12	0.03	0.00	0.00
	Treat + Lag + Control	t-stat	0.54	-1.16	0.41	-1.16	0.10
366 to 731	Treat + Lag + Control	Coef	-17.81	-0.51	-0.07	-0.02	-0.04
	Treat + Lag + Control	t-stat	-1.22	-1.11	-0.48	-1.18	-1.06
732 to 1825	Treat + Lag + Control	Coef	-41.49	-0.67	-0.04	-0.02	-0.06
	Treat + Lag + Control	t-stat	-1.36	-1.06	-0.11	-0.80	-0.76
1 to 1825	Treat + Lag + Control	Coef	-71.22*	-5.78*	-0.40	-0.21	-0.11
	Treat + Lag + Control	t-stat	-1.72	-1.69	-0.74	-1.50	-1.12
A2. With donut RD dropping 2000 (24-30 Dec.) and 2001 (4-10 Jan.)N=1,047							
-271 to -1	Treat + Lag + Control	Coef	9.65	-0.35	0.67	-0.01	-0.06
	Treat + Lag + Control	t-stat	0.75	-0.80	0.94	-0.85	-0.95
0 to 182	Treat + Lag + Control	Coef	-42.82**	-4.82	-0.39*	-0.18	-0.03
	Treat + Lag + Control	t-stat	-2.20	-1.41	-1.64	-1.30	-1.12
183 to 365	Treat + Lag + Control	Coef	7.64	-0.13	0.08	0.00	0.00
	Treat + Lag + Control	t-stat	1.47	-1.17	0.85	-1.17	0.16
366 to 731	Treat + Lag + Control	Coef	-11.64	0.42	-0.07	0.03	-0.07*
	Treat + Lag + Control	t-stat	-0.77	0.41	-0.36	0.59	-1.68
732 to 1825	Treat + Lag + Control	Coef	-1.18	2.64	0.40	0.09	-0.01
	Treat + Lag + Control	t-stat	-0.04	0.71	0.93	0.79	-0.12
1 to 1825	Treat + Lag + Control	Coef	-48.01	-1.89	0.02	-0.06	-0.10
	Treat + Lag + Control	t-stat	-1.11	-0.33	0.04	-0.29	-1.00
B1. Delivering mothers 2005 (25-31 Dec.) and 2006 (01-07 Jan.) N=1,119							
-271 to -1	Treat + Lag + Control	Coef	8.85	0.10	0.41	0.00	0.10
	Treat + Lag + Control	t-stat	1.01	0.86	1.44	0.86	1.63
0 to 182	Treat + Lag + Control	Coef	6.95	-0.02	0.18	0.01	0.00
	Treat + Lag + Control	t-stat	0.31	-0.03	0.86	0.46	-0.16
183 to 365	Treat + Lag + Control	Coef	-4.10	0.00***	-0.07	0.00***	0.00
	Treat + Lag + Control	t-stat	-0.73	-	-0.75	-	0.18
366 to 731	Treat + Lag + Control	Coef	-21.66	0.06	0.01	0.00	-0.02
	Treat + Lag + Control	t-stat	-1.37	0.62	0.07	0.63	-0.40
732 to 1825	Treat + Lag + Control	Coef	44.99	1.69	0.48	0.05	0.02
	Treat + Lag + Control	t-stat	1.33	1.31	0.87	1.45	0.16
1 to 1825	Treat + Lag + Control	Coef	26.18	1.73	0.60	0.06	-0.01
	Treat + Lag + Control	t-stat	0.58	1.17	0.93	1.51	-0.05
B2. With donut RD dropping 2005 (20-30 Dec.) and 2006 (4-10 Jan.) N=1,127							
-271 to -1	Treat + Lag + Control	Coef	0.87	0.11	0.45	0.01	0.12
	Treat + Lag + Control	t-stat	0.07	0.77	1.03	0.77	1.58
0 to 182	Treat + Lag + Control	Coef	-31.54	1.43	0.56	0.07	0.04
	Treat + Lag + Control	t-stat	-1.27	0.68	1.57	0.68	1.30
183 to 365	Treat + Lag + Control	Coef	-14.79**	0.00***	-0.16	0.00***	-0.01
	Treat + Lag + Control	t-stat	-2.06	-	-1.64	-	-0.55
366 to 731	Treat + Lag + Control	Coef	-4.17	0.17	0.13	0.01	0.01
	Treat + Lag + Control	t-stat	-0.24	0.85	0.58	0.86	0.10
732 to 1825	Treat + Lag + Control	Coef	35.87	0.66	0.50	0.02	0.01
	Treat + Lag + Control	t-stat	0.92	0.46	0.79	0.62	0.05
1 to 1825	Treat + Lag + Control	Coef	-14.64	2.26	1.04	0.10	0.04
	Treat + Lag + Control	t-stat	-0.28	0.88	1.32	0.91	0.32

Notes: Net Cost Drug are drug prices less patients contributions; MH indicates mental health; Total Cost are the sum of drug and physician fees; Treat is a dummy variable indicating that the observation is from the first week of January; Lag measures costs before day -271 in period 1 and 2 years before giving birth in periods 2 (0 to 182) to 6 (1 to 1825); Controls are dummy variables for five age groups of mothers and 16 administrative regions. Statistical significance: *=10%. **=5%; ***=1%.

Table 5: Non-parametric local estimations for costs, acts and visits, 2000-2001

Period in days	Specification	Para.	Cost$	Acts	Cost-MH $	Act-MH	Visit	Visit-MH
Optimal Data-driven Bandwidth Selection								
-271 to -1	Conventional	Coef.	16.46	-0.30	0.58	0.04	0.06	0.02
		z-stat	1.00	-0.36	0.22	0.45	0.11	0.34
0 to 182	Conventional	Coef.	-29.08	-0.66	-8.83	-0.23	-0.55	-0.16
		z-stat	-1.24	-1.31	-1.35	-1.21	-1.60	-1.33
183 to 365	Conventional	Coef.	-7.47	-0.27	-5.13**	-0.12*	-0.15	-0.11**
		z-stat	-0.76	-0.91	-2.31	-1.88	-0.70	-2.41
366 to 731	Conventional	Coef.	-40.03	-1.22	-5.85*	-0.16	-0.67	-0.12
		z-stat	-1.26	-1.52	-1.75	-1.48	-1.21	-1.48
732 to 1825	Conventional	Coef.	30.95	1.74	15.25	0.64*	1.01	0.25
		z-stat	0.61	1.36	1.30	1.66	1.10	1.11
1 to 1825	Conventional	Coef.	-68.79	-0.43	-4.32	0.13	-0.29	-0.14
		z-stat	-0.84	-0.20	-0.28	0.26	-0.19	-0.45
-271 to -1	Bias-corrected robust	Coef.	12.58	-0.61	1.26	0.06	-0.10	0.03
		z-stat	0.64	-0.66	0.39	0.62	-0.17	0.53
0 to 182	Bias-corrected robust	Coef.	-38.53	-0.84	-10.46	-0.28	-0.67*	-0.18
		z-stat	-1.40	-1.44	-1.25	-1.15	-1.66	-1.22
183 to 365	Bias-corrected robust	Coef.	-8.83	-0.31	-5.61**	-0.13	-0.19	-0.11**
		z-stat	-0.75	-0.87	-2.20	-1.59	-0.71	-2.04
366 to 731	Bias-corrected robust	Coef.	-51.83	-1.55*	-6.25	-0.18	-0.91	-0.13
		z-stat	-1.41	-1.67	-1.57	-1.39	-1.45	-1.36
732 to 1825	Bias-corrected robust	Coef.	22.86	1.88	18.75	0.76*	1.05	0.31
		z-stat	0.37	1.22	1.36	1.65	0.95	1.17
1 to 1825	Bias-corrected robust	Coef.	-101.36	-1.20	-3.43	0.16	-0.82	-0.17
		z-stat	-1.07	-0.48	-0.18	0.26	-0.46	-0.43
With Double Bandwidth								
-271 to -1	Conventional	Coef.	22.93**	0.62	-2.07	-0.03	0.45	-0.04
		z-stat	1.97	1.02	-0.88	-0.44	1.19	-0.83
0 to 182	Conventional	Coef.	-6.85	-0.23	-5.71	-0.14	-0.25	-0.10
		z-stat	-0.43	-0.66	-1.51	-1.26	-1.07	-1.43
183 to 365	Conventional	Coef.	-7.40	-0.20	-3.98**	-0.09**	-0.13	-0.09
		z-stat	-1.04	-0.95	-2.24	-2.04	-0.82	-2.55
366 to 731	Conventional	Coef.	-8.95	-0.16	-4.12*	-0.09	0.05	-0.07
		z-stat	-0.41	-0.28	-1.66	-1.19	0.13	-1.23
732 to 1825	Conventional	Coef.	35.38	1.55*	8.73	0.36	1.03	0.13
		z-stat	1.00	1.72	1.02	1.32	1.60	0.80
1 to 1825	Conventional	Coef.	14.02	1.55	-1.82	0.12	0.88	-0.07
		z-stat	0.25	1.02	-0.17	0.35	0.83	-0.31
-271 to -1	Bias-corrected robust	Coef.	19.20	-0.35	0.27	0.05	0.19	0.02**
		z-stat	1.13	-0.42	0.10	0.53	0.36	0.29
0 to 182	Bias-corrected robust	Coef.	-27.79	-0.80	-9.63	-0.24	-0.66*	-0.17
		z-stat	-1.15	-1.56	-1.45	-1.23	-1.84	-1.41
183 to 365	Bias-corrected robust	Coef.	-4.87	-0.21	-6.02**	-0.15**	-0.09	-0.13
		z-stat	-0.47	-0.67	-2.52	-2.23	-0.38	-2.73
366 to 731	Bias-corrected robust	Coef.	-46.76	-1.42*	-6.37*	-0.19*	-0.75	-0.14
		z-stat	-1.42	-1.69	-1.79	-1.69	-1.30	-1.66
732 to 1825	Bias-corrected robust	Coef.	30.50	1.77	15.79	0.69*	1.01	0.28
		z-stat	0.58	1.33	1.30	1.72	1.06	1.19
1 to 1825	Bias-corrected robust	Coef.	-48.47	0.32	-5.46	0.16	0.33	-0.13
		z-stat	-0.57	0.14	-0.34	0.31	0.21	-0.39

Notes: See Table 2 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 6: Non-parametric local estimations for costs, acts and visits, 2005-2006

Period in days	Specification	Para.	Cost$	Acts	Cost-MH $	Act-MH	Visit	Visit-MH
Optimal Data-driven Bandwidth Selection								
-271 to -1	Conventional	Coef.	47.64***	1.27*	3.74	0.16*	1.00**	0.11**
		z-stat	2.68	1.89	1.56	1.91	2.22	2.01
0 to 182	Conventional	Coef.	1.08	0.66*	1.23	0.10	0.35	0.07
		z-stat	0.04	1.67	0.40	0.98	1.36	1.15
183 to 365	Conventional	Coef.	-6.37	-0.09	-0.11	-0.01	-0.03	0.00
		z-stat	-0.57	-0.25	-0.04	-0.06	-0.15	-0.05
366 to 731	Conventional	Coef.	-16.83	-0.49	0.48	0.03	-0.32	-0.01
		z-stat	-0.67	-0.63	0.16	0.28	-0.69	-0.13
732 to 1825	Conventional	Coef.	69.71	1.92	11.73	0.35	0.87	0.23
		z-stat	1.16	1.23	0.85	0.84	0.85	0.95
1 to 1825	Conventional	Coef.	48.84	2.07	13.13	0.54	0.87	0.31
		z-stat	0.60	0.97	0.74	0.92	0.63	0.84
-271 to -1	Bias-corrected robust	Coef.	54.31***	1.47*	4.20	0.18*	1.13**	0.13*
		z-stat	2.58	1.83	1.41	1.81	2.11	1.84
0 to 182	Bias-corrected robust	Coef.	3.28	0.66	0.25	0.06	0.37	0.05
		z-stat	0.10	1.33	0.07	0.54	1.16	0.71
183 to 365	Bias-corrected robust	Coef.	-8.31	-0.16	-0.50	-0.03	-0.06	-0.02
		z-stat	-0.62	-0.37	-0.17	-0.27	-0.22	-0.24
366 to 731	Bias-corrected robust	Coef.	-15.96	-0.61	-0.01	0.04	-0.37	-0.02
		z-stat	-0.52	-0.64	0.00	0.28	-0.65	-0.21
732 to 1825	Bias-corrected robust	Coef.	93.93	2.52	9.83	0.33	1.23	0.21
		z-stat	1.33	1.37	0.61	0.65	1.02	0.74
1 to 1825	Bias-corrected robust	Coef.	76.08	2.76	8.16	0.43	1.34	0.22
		z-stat	0.78	1.08	0.40	0.61	0.80	0.50
With Double Bandwidth								
-271 to -1	Conventional	Coef.	29.78**	0.67	2.61	0.08	0.55	0.05
		z-stat	2.30	1.34	1.37	1.39	1.63	1.23
0 to 182	Conventional	Coef.	-5.90	0.55**	4.24*	0.21***	0.26	0.13***
		z-stat	-0.33	2.06	1.87	2.61	1.43	2.66
183 to 365	Conventional	Coef.	-4.08	-0.12	1.17	0.04	-0.09	0.02
		z-stat	-0.53	-0.50	0.58	0.53	-0.56	0.46
366 to 731	Conventional	Coef.	-25.82	-0.44	1.49	0.01	-0.35	0.01
		z-stat	-1.50	-0.82	0.59	0.07	-1.09	0.09
732 to 1825	Conventional	Coef.	16.37	0.64	13.14	0.30	0.15	0.17
		z-stat	0.40	0.60	1.31	1.03	0.21	1.01
1 to 1825	Conventional	Coef.	-17.89	0.46	21.17	0.64	-0.13	0.41
		z-stat	-0.32	0.32	1.55	1.51	-0.13	1.59
-271 to -1	Bias-corrected robust	Coef.	46.98**	1.45**	3.65	0.15*	1.12**	0.11**
		z-stat	2.54	2.08	1.52	1.86	2.40	2.04
0 to 182	Bias-corrected robust	Coef.	-0.24	0.69*	0.55	0.09	0.35	0.07
		z-stat	-0.01	1.69	0.17	0.86	1.31	1.07
183 to 365	Bias-corrected robust	Coef.	-4.16	-0.02	0.48	0.00	0.00	0.00
		z-stat	-0.36	-0.05	0.18	0.02	-0.01	0.01
366 to 731	Bias-corrected robust	Coef.	-15.03	-0.46	1.73	0.04	-0.27	0.00
		z-stat	-0.58	-0.57	0.53	0.27	-0.55	-0.04
732 to 1825	Bias-corrected robust	Coef.	70.38	1.85	12.81	0.45	0.79	0.31
		z-stat	1.13	1.15	0.89	1.05	0.75	1.27
1 to 1825	Bias-corrected robust	Coef.	55.71	2.03	16.54	0.63	0.79	0.35
		z-stat	0.66	0.93	0.88	1.02	0.55	0.92

Notes: See Table 2 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 7: Non-parametric local estimations associated with hospitalization, 2000-2001

Period in days	Specification	Para.	Cost $	Acts	Cost-MH $	Act-MH	Hospitalization
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	Coef.	15.1	0.8**	-0.2	0.0	0.0
		z-stat	1.6	2.0	-0.8	-0.1	0.5
0 to 182	Conventional	Coef.	-28.2	-0.3	-3.7	-0.1	0.0
		z-stat	-1.4	-1.2	-1.2	-1.1	0.1
183 to 365	Conventional	Coef.	2.1	0.0	-0.1	0.0	0.0
		z-stat	0.4	0.4	-1.0	-1.0	-0.2
366 to 731	Conventional	Coef.	-10.3	-0.1	-0.5	0.0	0.0
		z-stat	-0.6	-0.3	-0.9	-1.0	-1.1
732 to 1825	Conventional	Coef.	-11.5	0.3	0.4	0.0	0.0
		z-stat	-0.4	0.7	0.3	0.9	-0.3
1 to 1825	Conventional	Coef.	-60.9	-0.1	-3.4	-0.1	-0.1
		z-stat	-1.4	-0.2	-0.9	-0.8	-0.6
-271 to -1	Bias-corrected robust	Coef.	14.6	0.9**	-0.2	0.0	0.0
		z-stat	1.3	2.0	-0.6	0.1	0.4
0 to 182	Bias-corrected robust	Coef.	-35.2	-0.4	-4.5	-0.2	0.0
		z-stat	-1.4	-1.3	-1.2	-1.1	0.3
183 to 365	Bias-corrected robust	Coef.	1.8	0.0	-0.1	0.0	0.0*
		z-stat	0.3	0.4	-0.7	-0.9	-0.2
366 to 731	Bias-corrected robust	Coef.	-14.7	-0.1	-0.7	0.0	0.0
		z-stat	-0.7	-0.3	-1.2	-1.3	-1.0
732 to 1825	Bias-corrected robust	Coef.	-16.9	0.3	0.2	0.0	0.0
		z-stat	-0.5	0.6	0.2	1.0	-0.3
1 to 1825	Bias-corrected robust	Coef.	-77.5	-0.3	-4.6	-0.2	-0.1
		z-stat	-1.5	-0.5	-1.1	-0.9	-0.6
With Double Bandwidth							
-271 to -1	Conventional	Coef.	12.8	0.5*	-0.3	0.0	0.0
		z-stat	1.9	1.9	-1.1	-0.9	0.6
0 to 182	Conventional	Coef.	-11.3	-0.1	-2.2	-0.1	0.0
		z-stat	-0.8	-0.6	-1.2	-1.1	-0.3
183 to 365	Conventional	Coef.	-0.2	0.0	0.0	0.0	0.0
		z-stat	0.0	0.2	0.1	-0.9	-0.7
366 to 731	Conventional	Coef.	-4.0	0.0	-0.1	0.0	0.0
		z-stat	-0.3	0.0	-0.1	-0.1	-1.3
732 to 1825	Conventional	Coef.	-2.5	0.4	1.5	0.0	0.0
		z-stat	-0.1	1.4	1.0	0.8	-0.1
1 to 1825	Conventional	Coef.	-27.3	0.3	-1.3	0.0	-0.1
		z-stat	-0.9	0.6	-0.5	-0.4	-0.9
-271 to -1	Bias-corrected robust	Coef.	16.0	0.9**	-0.2	0.0	0.0
		z-stat	1.6	2.2	-0.5	-0.4	0.7
0 to 182	Bias-corrected robust	Coef.	-31.0	-0.4	-3.7	-0.1	0.0
		z-stat	-1.5	-1.4	-1.2	-1.1	0.4
183 to 365	Bias-corrected robust	Coef.	2.9	0.1	-0.1	0.0	0.0
		z-stat	0.5	0.6	-0.5	-0.6	0.2
366 to 731	Bias-corrected robust	Coef.	-12.0	-0.1	-0.7	0.0	0.0
		z-stat	-0.7	-0.7	-1.2	-1.2	-0.7
732 to 1825	Bias-corrected robust	Coef.	-17.4	0.2	1.3	0.1	0.0
		z-stat	-0.6	0.5	1.0	1.2	-0.3
1 to 1825	Bias-corrected robust	Coef.	-55.9	-0.2	-2.9	-0.1	0.0
		z-stat	-1.2	-0.3	-0.7	-0.7	-0.5

Notes: See Table 4 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 8: Non-parametric local estimations associated with hospitalization, 2005-2006

Period in days	Specification		Cost $	Acts	Cost-MH $	Act-MH	Hospitalization
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	Coef.	8.1	0.3	0.1	0.0	0.1
		z-stat	0.9	0.9	1.0	0.9	1.0
0 to 182	Conventional	Coef.	3.6	0.3	0.4	0.0	0.0
		z-stat	0.1	1.3	0.4	0.5	-0.3
183 to 365	Conventional	Coef.	-5.2	-0.1	-0.1	0.0	0.0
		z-stat	-1.0	-1.0	-0.7	-1.1	-0.1
366 to 731	Conventional	Coef.	-12.1	0.1	-0.1	0.0	0.0
		z-stat	-0.8	0.9	-1.2	-1.0	0.5
732 to 1825	Conventional	Coef.	29.6	0.6	2.1	0.1	0.0
		z-stat	0.8	1.2	1.4	1.5	0.2
1 to 1825	Conventional	Coef.	13.4	0.8	3.1	0.1	0.0
		z-stat	0.3	1.4	1.4	1.5	0.3
-271 to -1	Bias-corrected robust	Coef.	10.2	0.3	0.1	0.0	0.1
		z-stat	1.0	0.9	0.4	0.4	1.1
0 to 182	Bias-corrected robust	Coef.	8.7	0.3	0.2	0.0	0.0
		z-stat	0.3	0.9	0.1	0.2	-0.4
183 to 365	Bias-corrected robust	Coef.	-6.6	-0.2	-0.1	0.0	0.0
		z-stat	-1.0	-1.2	-0.6	-0.9	-0.3
366 to 731	Bias-corrected robust	Coef.	-9.8	0.2	-0.1*	0.0	0.0
		z-stat	-0.5	0.9	-1.7	-0.8	0.5
732 to 1825	Bias-corrected robust	Coef.	44.9	0.8	2.6	0.1	0.1
		z-stat	1.1	1.4	1.5	1.5	0.5
1 to 1825	Bias-corrected robust	Coef.	33.3	1.1	3.8	0.1	0.1
		z-stat	0.6	1.5	1.5	1.5	0.5
With Half Bandwidth							
-271 to -1	Conventional	Coef.	1.7	0.1	0.2	0.0*	0.0
		z-stat	0.2	0.5	1.4	1.8	0.3
0 to 182	Conventional	Coef.	-5.6	0.3*	0.4	0.0	0.0
		z-stat	-0.4	1.8	0.5	1.2	0.4
183 to 365	Conventional	Coef.	-2.4	0.0	0.1	0.0	0.0
		z-stat	-0.6	-0.4	0.2	0.3	0.5
366 to 731	Conventional	Coef.	-18.3*	0.0	0.1	0.0	0.0
		z-stat	-1.8	0.3	0.7	1.5	-0.2
732 to 1825	Conventional	Coef.	-6.6	0.0	1.4	0.0	0.0
		z-stat	-0.3	0.1	1.0	1.6	-0.7
1 to 1825	Conventional	Coef.	-34.7	0.2	0.9	0.1*	0.0
		z-stat	-1.1	0.5	0.5	1.6	-0.6
-271 to -1	Bias-corrected robust	Coef.	7.0	0.2	0.0	0.0	0.1
		z-stat	0.8	0.8	-0.3	0.4	1.3
0 to 182	Bias-corrected robust	Coef.	-0.1	0.3	0.7	0.0	0.0
		z-stat	0.0	1.3	0.6	1.0	-0.3
183 to 365	Bias-corrected robust	Coef.	-3.3	-0.1	-0.1	0.0	0.0
		z-stat	-0.6	-0.5	-0.3	-1.2	-0.4
366 to 731	Bias-corrected robust	Coef.	-13.4	0.1	-0.2	0.0	0.0
		z-stat	-0.9	0.9	-1.3	-0.9	0.4
732 to 1825	Bias-corrected robust	Coef.	43.0	0.7	3.3*	0.1*	0.0
		z-stat	1.2	1.3	1.8	1.9	0.2
1 to 1825	Bias-corrected robust	Coef.	25.3	0.8	3.6	0.2*	0.0
		z-stat	0.5	1.3	1.5	2.0	0.2

Notes: See Table 4 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 9: Non-parametric local estimations for net public costs of prescription drugs (all and type) and associated physicians fees, 2000-2001

Period in days	Specification	Para-meter	Net Cost Drug	Net Cost Drug-MH	Total Cost	Number Drug	Number Drug-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	Coef.	-13.56	0.90	9.40	0.13	-0.05
		t-stat	-0.56	0.55	0.31	0.27	-0.62
0 to 182	Conventional	Coef.	10.50	0.45	9.61	0.26	0.02
		t-stat	1.47	0.14	0.26	0.77	0.08
183 to 365	Conventional	Coef.	-0.42	-3.55	-3.46	0.05	-0.09
		t-stat	-0.04	-1.02	-0.17	0.13	-0.71
366 to 731	Conventional	Coef.	-3.37	-7.81	-34.56	0.52	-0.46
		t-stat	-0.10	-0.85	-0.80	0.71	-1.51
732 to 1825	Conventional	Coef.	47.03	-32.79	80.38	0.23	-1.39
		t-stat	0.30	-0.90	0.42	0.12	-1.41
1 to 1825	Conventional	Coef.	1.94	-42.91	48.15	0.98	-1.92
		t-stat	0.01	-0.88	0.21	0.35	-1.45
-271 to -1	Bias-corrected robust	Coef.	-34.69	-1.46	23.08	-0.43	-0.15
		t-stat	-0.77	-0.65	0.46	-0.54	-1.32
0 to 182	Bias-corrected robust	Coef.	8.89	-3.17	-34.62	0.10	-0.18
		z-stat	0.96	-0.62	-0.61	0.19	-0.58
183 to 365	Bias-corrected robust	Coef.	-4.16	-5.77	6.28	-0.27	-0.19
		z-stat	-0.25	-1.07	0.19	-0.47	-0.97
366 to 731	Bias-corrected robust	Coef.	-18.39	-20.28	-21.99	-0.30	-0.96*
		z-stat	-0.61	-1.37	-0.35	-0.27	-1.99
732 to 1825	Bias-corrected robust	Coef.	-7.92	-32.13	-122.34	-0.04	-1.76
		z-stat	-0.05	-0.56	-0.53	-0.01	-1.25
1 to 1825	Bias-corrected robust	Coef.	71.80	-48.97	-197.42	-0.47	-3.12
		z-stat	0.42	-0.68	-0.69	-0.12	-1.59
With Double Bandwidth							
-271 to -1	Conventional	Coef.	-13.6	0.9	9.4	0.1	-0.1
		z-stat	-0.6	0.5	0.3	0.3	-0.6
0 to 182	Conventional	Coef.	10.5	0.4	9.6	0.3	0.0
		z-stat	1.5	0.1	0.3	0.8	0.1
183 to 365	Conventional	Coef.	-0.4	-3.5	-3.5	0.0	-0.1
		z-stat	0.0	-1.0	-0.2	0.1	-0.7
366 to 731	Conventional	Coef.	-3.4	-7.8	-34.6	0.5	-0.5
		z-stat	-0.1	-0.8	-0.8	0.7	-1.5
732 to 1825	Conventional	Coef.	47.0	-32.8	80.4	0.2	-1.4
		z-stat	0.3	-0.9	0.4	0.1	-1.4
1 to 1825	Conventional	Coef.	1.9	-42.9	48.1	1.0	-1.9
		z-stat	0.0	-0.9	0.2	0.3	-1.5
-271 to -1	Bias-corrected robust	Coef.	-34.7	-1.5	23.1	-0.4	-0.1
		z-stat	-0.8	-0.7	0.5	-0.5	-1.3
0 to 182	Bias-corrected robust	Coef.	8.9	-3.2	-34.6	0.1	-0.2
		z-stat	1.0	-0.6	-0.6	0.2	-0.6
183 to 365	Bias-corrected robust	Coef.	-4.2	-5.8	6.3	-0.3	-0.2
		z-stat	-0.3	-1.1	0.2	-0.5	-1.0
366 to 731	Bias-corrected robust	Coef.	-18.4	-20.3	-22.0	-0.3	-1.0**
		z-stat	-0.6	-1.4	-0.4	-0.3	-2.0
732 to 1825	Bias-corrected robust	Coef.	-7.9	-32.1	-122.3	0.0	-1.8
		z-stat	0.0	-0.6	-0.5	0.0	-1.2
1 to 1825	Bias-corrected robust	Coef.	71.8	-49.0	-197.4	-0.5	-3.1
		z-stat	0.4	-0.7	-0.7	-0.1	-1.6

Notes: See Table 3 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 10: Non-parametric local estimations for net public costs of prescription drugs (all and type) and associated physicians fees, 2005-2006

Period in days	Specification	Para-meter	Net Cost Drug	Net Cost Drug-MH	Total Cost	Number Drug	Number Drug-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	Coef.	-32.73	-3.77	2.05	-0.19	-0.04
		t-stat	-1.04	-0.60	0.04	-0.27	-0.28
0 to 182	Conventional	Coef.	0.45	-0.17	10.77	0.71*	0.09
		t-stat	0.03	-0.04	0.19	1.76	0.48
183 to 365	Conventional	Coef.	34.74	6.87	51.08	0.89*	0.50**
		t-stat	0.58	1.56	0.75	1.80	2.42
366 to 731	Conventional	Coef.	3.52	16.11*	-18.19	1.94*	0.90**
		t-stat	0.02	1.77	-0.12	1.96	2.43
732 to 1825	Conventional	Coef.	80.15	63.80*	55.15	6.33**	3.34**
		t-stat	0.42	1.93	0.19	2.21	2.53
1 to 1825	Conventional	Coef.	94.00	103.9*	101.0	10.27**	4.59***
		t-stat	0.24	2.55	0.21	2.53	2.69
-271 to -1	Bias-corrected robust	Coef.	-32.02	-5.93	1.86	-0.11	-0.08
		t-stat	-0.83	-0.85	0.03	-0.13	-0.48
0 to 182	Bias-corrected robust	Coef.	3.33	-0.93	18.57	0.82*	0.08
		z-stat	0.20	-0.17	0.28	1.69	0.35
183 to 365	Bias-corrected robust	Coef.	50.70	5.97	69.69	1.08*	0.55**
		z-stat	0.69	1.18	0.83	1.83	2.28
366 to 731	Bias-corrected robust	Coef.	18.99	17.68	4.25	2.05*	0.84*
		z-stat	0.11	1.60	0.02	1.71	1.93
732 to 1825	Bias-corrected robust	Coef.	90.03	58.25	58.62	7.35**	3.54**
		z-stat	0.41	1.50	0.17	2.15	2.22
1 to 1825	Bias-corrected robust	Coef.	92.39	94.14/	54.61	12.08**	4.87**
		z-stat	0.22	1.94	0.10	2.55	2.44
With Double Bandwidth							
-271 to -1	Conventional	Coef.	-37.6	-0.4	8.7	0.0	0.0
		z-stat	-1.4	-0.1	0.2	-0.1	0.3
0 to 182	Conventional	Coef.	-1.7	0.9	15.2	0.5	0.1
		z-stat	-0.2	0.3	0.4	1.6	0.7
183 to 365	Conventional	Coef.	14.0	9.0**	18.3	0.4	0.3*
		z-stat	0.4	2.0	0.4	1.2	1.9
366 to 731	Conventional	Coef.	-66.0	21.1**	-101.6	1.2*	0.9***
		z-stat	-0.7	2.5	-1.0	1.7	3.0
732 to 1825	Conventional	Coef.	56.4	81.8**	54.2	3.6*	2.6**
		z-stat	0.3	2.2	0.2	1.7	2.4
1 to 1825	Conventional	Coef.	2.8	117.7*	-3.6	5.0*	3.4**
		z-stat	0.0	2.2	0.0	1.7	2.4
-271 to -1	Bias-corrected robust	Coef.	-27.8	-3.1	7.1	-0.4	0.0
		z-stat	-0.8	-0.5	0.1	-0.5	-0.2
0 to 182	Bias-corrected robust	Coef.	-8.1	2.1	-10.1	0.6	0.1
		z-stat	-0.5	0.4	-0.2	1.5	0.7
183 to 365	Bias-corrected robust	Coef.	34.9	10.8*	48.8	1.0**	0.6***
		z-stat	0.6	2.0	0.7	2.0	2.7
366 to 731	Bias-corrected robust	Coef.	8.2	6.8	-20.6	2.2**	1.1***
		z-stat	0.1	0.6	-0.1	2.2	2.7
732 to 1825	Bias-corrected robust	Coef.	47.2	39.7	110.2	7.9***	3.6**
		z-stat	0.2	0.7	0.4	2.6	2.5
1 to 1825	Bias-corrected robust	Coef.	217.3	88.7*	227.5	11.7***	5.8***
		z-stat	0.5	1.9	0.4	2.7	3.0

Notes: See Table 3 and text. Statistical significance: *=10%. **=5%; ***=1%.

Table 11A: Summary statistics on mothers' medical acts, prescription drugs, and births, by selected year

	1998 Oct-Dec	1999 Jan-March	2000 Oct-Dec	2001 Jan-March	2005 Oct-Dec	2006 Jan-March
Medical acts						
Acts (7 years) N	691,775	710,010	674,917	744,164	709,943	755,856
Total cost (7 years) $	$24.4 m	$25.8 m	$25.2 m	$28.3 m	$31.1 m	$33.2 m
Mean cost per act $	$35.3	$36.4	$37.3	$38.0	$43.9	$43.9
Mothers N	8,861	9,139	8,553	9,447	8,702	9,298
Cost per mother (7 years) $	2,754	2,823	2,946	2,996	3,574	3,571
Prescription drugs						
Net cost drugs (7 years) $	145,119	152,511	149,546	156,620	149,698	149,537
Mothers eligible at birth N	3,403	3,433	3,209	3,327	2,895	2,913
Cost per mother (7 years) $	$42.6	$44.4	$46.6	$47.1	$51.7	$51.4
Births						
Total births same 3 months	17,439	17,206	16,316	17,436	18,091	20,175
Total births in year	75,865	73,599	72,010	73,699	76,341	81,962

Notes: m = million nominal $.

Sources: Authors' calculation from RAMQ data sets; annual births from Québec's Institute of Statistics.

Table 11B: Summary financial statistics of parental leave programs (millions of nominal dollars), births and coverage, for selected years

	1998	2000	2001	2005		2006	2007	2008	2009	2010	2011	2012	2013
	Federal program					**Québec program**							
Benefits	255	278	399	722		1,176#	1,451	1,561	1,649	1,697	1,732	1,803	1,900
Payroll taxes	N.A	N.A	N.A	N.A		1,184#	1,233	1,344	1,511	1,624	1,802	1,929	2,018
Operating cost	N.A	N.A	N.A	N.A		31	36	44	42	41	40	37	39
Current Deficit	0	0	0	0		-23	-236	-252	-180	-110	+13	+74	+102
Cumulated deficit	0	0	0	0		23	32##	284	464	591	578	504	448
Insurable earnings	39,000	39,000	39,000	39,000		57,000	59,000	60,500	62,000	62,500	64,000	66,000	67,500
Premium employees	-	-	-	0.340*		0.416	0.416	0.450	0.484	0.506	0.537	0.559	0.559
Premium employers	-	-	-	0.476*		0.583	0.583	0.630	0.677	0.708	0.752	0.782	0.782
Premium self-employed	0	0	0	0*		0.737	0.737	0.800	0.860	0.889	0.955	0.993	0.993
Births	75,865	72,010	73,699	76,341		81,962	84,200	87,600	88,600	88,300	88,500	88,700	88,600
Mothers with benefits	37,174	37,301	40,608	50,309		65,130	63,598	67,426	69,289	68,312	68,924	70,380	68,945
Coverage %	49.0	51.8	55.1	65.9		79.5	75.5	77.0	78.2	77.4	77.8	79.3	77.8
Benefits per mother	6,860	7,453	9,826	14,351		21,188	22,815	23,151	23,799	24,842	25,129	25,618	27,558

Sources: Financial statistics derived from the Actuary's annual report of the QPIP; annual births from Québec's Institute of Statistics; coverage and other statistics, authors' calculation from Statistics Canada's Employment Insurance Coverage Survey and Employment Insurance Benefits, and published administrative data from QPIP.
Notes: Benefits include all maternal (maternity, adoption) and parental benefits. N.A.: Not relevant. The federal government does not present programs or payroll taxes for each EI subprograms. The Employment Insurance Act requires a premium rate to be set annually to ensure that EI cumulative revenues and expenditures break even after December 31. Over the whole 2000 decade, premium revenues were higher that program costs and decreased almost every year. Mothers with benefits include adopting mothers (around 500-600 per year). Benefits per mother are for covered mothers. #The figures do not take into account the financial aspects of the agreement between the federal and Québec governments to devolve the parental leave program which had three clauses: a) the federal government would lend 200 million $ to help Québec start the implementation of the program; b) Québec would pay in 2006 the benefits according to the federal 2005 parameters to mothers/parents who were still eligible for benefits in 2006 (e.g. mothers delivering in December 2005); c) Québec would repay the total loan, established at 346.6 million $ at the end/start of 2006-2007, to the federal government without interest after agreeing on a schedule beginning on 2009. Maybe because of the financial crisis, it is only in January 5th 2011 that Québec (considered as the debtor) reimburse totally the loan (adding the amount to Québec's public debt). In 2014, the government decided that the regime would repay each year the debt with interests to the tune of 94 million dollars. ##For this year the balance sheet includes as revenue the 200 million $ from the federal gouvernement. *These are notional premium/$100 estimated by the federal government to finance the leave program (including operation costs); Québec's taxpayer's wage earners and employers were given this rebate on EI federal contributions.

Table 12: Selected characteristics of Québec's mothers with a child aged 0 to 12 months by year, 2000-2012

	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Monthly household income in month before birth or adoption [per annum]												
Less than $1,600 [<$20,000]	12 (8)	12 16)	16 (15)	20 (12)	18 (8)	14 (4)	12 (8)	16 (9)	14 (10)	10 (8)	12 (7)	10 (8)
$1,600 to <$3,300 [$20,000-$40,000]	23 (35)	27 (41)	37 (41)	48 (51)	34 (33)	38 (40)	29 (28)	37 (42)	35 (30)	34 (31)	39 (39)	41 (43)
$3,300 to <$5,000 [$40,000-$60,000]	16 (28)	9 (13)	16 (19)	16 (20)	19 (22)	20 (23)	25 (27)	16 (18)	22 (27)	24 (24)	16 (19)	19 (21)
More than $5,000 [>$60,000]	11 (20)	16 (26)	15 (21)	11 (16)	22 (28)	25 (28)	27 (32)	26 (29)	22 (27)	30 (34)	26 (30)	26 (37)
Valid skip & not stated	38# (9)	35# (4)	17## (4)	19* (2)	5* (9)	4* (5)	7* (5)	5* (3)	7* (6)	3* (3)	6* (5)*	5* (2)
Highest education												
Grade 8-13 non graduate	18 (6)	20 (14)	12 (8)	7 (5)	9 (4)	9 (3)	10 (5)	9 (7)	9 (8)	9 (7)	11 (4)	6 (4)
Grade 11-13 graduate	14 (8)	15 (15)	14 (11)	9 (8)	8 (8)	7 (6)	9 (8)	9 (8)	9 (4)	11 (11)	8 (7)	10 (8)
Some post-graduate	12 (11)	5 (6)	9 (7)	8 (7)	5 (6)	7 (7)	4 (3)	5 (5)	4 (5)	5 (3)	6 (6)	4 (4)
Trade/college diploma/cert.	34 (45)	30 (34)	36 (41)	49 (62)	46 (46)	41 (45)	42 (49)	42 (44)	44 (48)	38 (40)	38 (42)	34 (35)
University graduate or more	21 (30)	30 (32)	27 (32)	27 (19)	31 (35)	36 (39)	35 (35)	35 (37)	34 (35)	38 (39)	38 (41)	46 (49)
Canadian by birth	89 (98)	85 (90)	91 (95)	81 (95)	87 (95)	85 (92)	82 (88)	78 (84)	81 (86)	83 (84)	79 (82)	81 (86)
Occupation **												
Management, business, finance & adm.	25 (39)	18 (30)	20 (20)	32 (40)	32 (38)	24 (30)	26 (30)	26 (30)	19 (22)	28 (29)	20 (23)	27 (29)
Health and natural applied sciences	7 (12)	9 (15)	15 (21)	6 (9)	13 (21)	18 (21)	19 (19)	14 (16)	15 (17)	22 (22)	25 (29)	20 (23)
Social science, education & public sec.	11 (16)	9 (10)	18 (22)	16 (21)	16 (23)	20 (25)	23 (24)	24 (26)	28 (31)	25 (26)	23 (24)	25 (29)
Trade, transport, sales, service & utilit.	23 (28)	30 (41)	23 (23)	25 (30)	26 (20)	26 (23)	26 (27)	31 (28)	33 (30)	25 (22)	30 (25)	22 (19)
Valid skip & not stated	35 (4)	32 (4)	23 (10)	22 (1)	13 (3)	7 (3)	7 (0)	5 (0)	6 (0)	0 (0)	0 (0)	5 (0)
Industry groups NAICS 1997**												
Agriculture, forestry, fishing, mining, construction & manufacturing	7 (10)	15 (22)	15 (17)	12 (15)	14 (18)	14 (14)	15 (16)	16 (16)	13 (17)	11 (10)	9 (10)	7 (8)
Retail, trade, food & services	22 (30)	20 (24)	17 (19)	16 (17)	16 (11)	21 (19)	13 (15)	16 (15)	16 (12)	15 (16)	25 (24)	17 (12)
Education, health care, social, & gov.	19 (28)	20 (31)	27 (33)	27 (36)	34 (45)	35 (40)	41 (43)	38 (41)	41 (47)	42 (46)	43 (44)	47 (53)
All others	17 (28)	12 (19)	17 (19)	24 (31)	23 (24)	19 (24)	23 (26)	24 (28)	24 (24)	31 (28)	21 (23)	24 (26)
Valid skip & not stated	36 (5)	33 (3)	24 (12)	22 (1)	13 (2)	12 (3)	7 (0)	6 (0)	6 (0)	0 (1)	2 (6)	5 (0)
With supplement (18 weeks or more)***	33 (18)	34 (15)	30 (16)	35 (19)	44 (23)	36 (17)	32 (18)	29 (22)	26 (15)	35 (18)	28 (14)	31 (21)
Number of mothers	239	212	217	209	229	227	246	262	211	226	237	203

Notes: In some cases, the total may not add to 100% because of rounding out or if the not stated figures are ignored. Percentages in parenthesis indicate mothers who received maternal/parental benefits; otherwise the percentages apply to all mothers.

#Mothers who have worked in a paid job, except if last worked as self-employed within the past two years; ##Mothers who have worked in a paid job within past two years; *All mothers of a child aged 0 to 12 months; **If ever worked; ***If mother received maternal or parental benefits.

Source: Authors' calculation from Statistics Canada's Employment Insurance Coverage Survey, (annual) weighted micro-data.

Statistical Appendix

Table A1: Samples of delivering mothers by year and month

	Sample 1 Federal maternal leave policy change groups		Sample 2 Québec maternal leave policy change groups		All
	Pre-reform	Post-reform	Pre-reform	Post-reform	
Month	2000	2001	2005	2006	Total
1	0	3,018	0	3,076	6,094
2	0	2,943	0	2,979	5,922
3	0	3,486	0	3,243	6,729
10	2,930	0	3,101	0	6,031
11	2,813	0	2,859	0	5,672
12	2,810	0	2,742	0	5,552
Total A	8,553	9,447	8,702	9,298	36,000
Total B	18,000		18,000		36,000
	Prescription drug eligibility				
Month	2000	2001	2005	2006	Total
1	0	1,794	0	1,818	5,295
2	0	1,785	0	1,646	5,055
3	0	2,001	0	1,839	5,664
10	1,833	0	1,833	0	5,412
11	1,734	0	1,682	0	5,008
12	1,719	0	1,641	0	5,025
Total	5,286	5,580	5,156	5,303	31,459

Source: Authors' computations from RAMQ data sets.

Table A2: Number of prescription drugs by year and eligibility status, 2000-2001 and 2005-2006

Program	STD	Tuberculosis	OCU	H1N1	Adherent	Welfare	Total
Year				2000			
Freq.	564	224	387	0	86,896	61,475	149,546
%	0.38	0.15	0.26	0	58.11	41.11	100.00
Year				2001			
Freq.	500	264	451	0	91,848	63,557	156,62
%	0.32	0.17	0.29	0	58.64	40.58	100.00
Year				2005			
Freq.	429	203	1,971	30	86,32	60,745	149,698
%	0.29	0.14	1.32	0.02	57.66	40.58	100.00
Year				2006			
Freq.	435	179	2,052	35	92,359	54,477	149,537
%	0.29	0.12	1.37	0.02	61.76	36.43	100.00

Source: Authors' computations from RAMQ data sets.

Notes: STD: Sexually transmitted decease; Tuberculosis: eligibility by default; OCU: oral contraception urgency; H1N1: influenza eligibility; Adherent: persons who are not eligible for a private plan and must therefore pay the public plan premium; Welfare: recipients of last-resort financial assistance are automatically registered for the public plan.

Table A3: Number of prescription drugs by type, eligibility status, and year, 2000-2001 and 2005-2006

	Sample 1 Federal maternal leave policy change groups		Sample 2 Québec maternal leave policy change groups	
	Pre-reform	Post-reform	Pre-reform	Post-reform
Month	2000	2001	2005	2006
1	0	23,796	0	23,217
% CNSA		19.1		22.9
2	0	19,499	0	20,706
% CNSA		18.0		20.9
3	0	24,884	0	26,995
% CNSA		19.1		19.9
10	21,178	0	20,540	0
% CNSA	17.0		22.1	
11	21,312	0	19,388	0
% CNSA	23.8		21.2	
12	20,804	0	22,625	0
% CNSA	20.1		21.9	
Total	63,294	68,179	62,553	70,918
% CNSA	20.3	18.8	21.7	21.0
Total N-adherent	2,066	2,175	1,960	2,051
Mothers eligible by welfare status to the public prescription drugs plan at day of childbirth				
1	0	19,628	0	16,401
% CNSA		29.6		29.9
2	0	19,666	0	13,671
% CNSA		34.6		25.9
3	0	20,487	0	19,259
% CNSA		30.1		25.7
10	18,359	0	19,075	0
% CNSA	23.1		32.4	
11	19,431	0	18,990	0
% CNSA	30.8		31.9	
12	21,218	0	20,469	0
% CNSA	32.6		38.7	
Total	59,008	59,781	58,534	49,331
% CNSA	29.1	31.4	34.4	27.1
Total N-Welfare	1,143	1,152	935	862
Total N	3,209	3,327	2,895	2,913
% Adherent	64.38	65.37	67.70	70.41
% CNSA				
Adherent	20.3	18.8	21.7	21.0
Welfare	30.1	31.4	34.4	27.6

Source: Authors' computations from RAMQ prescribed drugs registries.

Notes: CNSA: Central nervous system agents (antipsychotic and antidepressant medication drugs).

Table A4: Number of childbirths by month and year in Québec, 2000-2001 and 2005-2006

Year	2000		2001		2005		2006	
Month	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	5,928	8.23	5,764	7.82	5,829	7.64	6,463	7.89
2	5,882	8.17	5,65	7.67	5,546	7.26	6,182	7.54
3	6,407	8.90	6,576	8.92	6,566	8.60	6,838	8.34
4	6,449	8.96	6,534	8.87	6,569	8.60	6,668	8.14
5	6,623	9.20	6,641	9.01	6,744	8.83	6,992	8.53
6	6,305	8.76	6,243	8.47	6,661	8.73	6,915	8.44
7	6,157	8.55	6,254	8.49	6,763	8.86	7,097	8.66
8	6,043	8.39	6,425	8.72	6,792	8.90	7,267	8.87
9	5,900	8.19	6,176	8.38	6,780	8.88	7,365	8.99
10	5,632	7.82	6,136	8.33	6,345	8.31	7,095	8.66
11	5,364	7.45	5,664	7.69	6,124	8.02	6,654	8.12
12	5,320	7.39	5,636	7.65	5,622	7.36	6,426	7.84
Total	72,010	100.00	73,699	100.00	76,341	100.00	81,962	100.00

Source: Authors' computations from annual Births Registries.

Table A5: Characteristics of mothers and newborns by selected year and month

			Mother's Place of birth			
2000-2001	10	11	12	1	2	3
Québec	0.76	0.77	0.77	0.77	0.78	0.79
RofC	0.05	0.06	0.05	0.06	0.05	0.06
Other	0.19	0.16	0.17	0.16	0.16	0.14
2005-2006	10	11	12	1	2	3
Québec	0.75	0.75	0.73	0.74	0.73	0.74
RofC	0.06	0.06	0.06	0.06	0.05	0.05
Other	0.18	0.18	0.20	0.17	0.21	0.18
			Age group of the mother at child birth			
2000-2001	10	11	12	1	2	3
11-16	0.00	0.00	0.00	0.00	0.00	0.00
17-35	0.90	0.88	0.89	0.89	0.90	0.90
36 or more	10	11	12	1	2	3
2005-2006	10.00	11.00	12.00	1.00	2.00	3.00
11-16	0.00	0.00	0.00	0.00	0.00	0.00
17-35	0.88	0.89	0.88	0.89	0.89	0.89
36 or more	0.11	0.11	0.12	0.11	0.11	0.11
			Mean age of the mother at child birth			
2000-2001	10	11	12	1	2	3
Age	28.3	28.5	28.3	28.4	28.4	28.6
2005-2006	10	11	12	1	2	3
Age	29.0	29.0	28.8	29.1	29.1	29.1
			Mother's mother tongue			
2000-2001	10	11	12	1	2	3
French	0.79	0.80	0.80	0.80	0.81	0.81
English	0.12	0.11	0.11	0.11	0.11	0.11
Other	0.00	0.01	0.01	0.01	0.01	0.01
2005-2006	10	11	12	1	2	3
French	0.77	0.77	0.76	0.78	0.78	0.77
English	0.12	0.12	0.12	0.10	0.10	0.11
Other	0.01	0.01	0.01	0.01	0.01	0.01
			Family status of the mother			
2000-2001	10	11	12	1	2	3
Couple	0.88	0.86	0.87	0.87	0.85	0.86
Single parent	0.07	0.08	0.08	0.08	0.08	0.08
2005-2006	10	11	12	1	2	3
Couple	0.87	0.88	0.87	0.87	0.86	0.86
Single parent	0.07	0.06	0.07	0.08	0.08	0.08
			Mother's level of education			
2000-2001	10	11	12	1	2	3
No diploma	0.06	0.07	0.08	0.07	0.07	0.07
High school	0.25	0.25	0.25	0.24	0.22	0.22
College	0.29	0.29	0.28	0.30	0.31	0.29
University or more	0.25	0.26	0.25	0.27	0.28	0.31
2005-2006	10	11	12	1	2	3
No diploma	0.06	0.07	0.07	0.05	0.05	0.04
High school	0.19	0.19	0.22	0.21	0.20	0.20
College	0.29	0.27	0.28	0.26	0.24	0.25
University or more	0.33	0.33	0.29	0.31	0.31	0.29

Table A5 continued

			Sex of child			
2000-2001	10.00	11.00	12.00	1.00	2.00	3.00
Boy	0.51	0.52	0.52	0.51	0.52	0.51
2005-2006	10	11	12	1	2	3
Boy	0.50	0.51	0.52	0.51	0.52	0.52
			Birth weight of child			
2000-2001	10	11	12	1	2	3
Weight kg	3373	3377	3358	3352	3358	3362
Std	580	581	602	580	587	562
2005-2006	10	11	12	1	2	3
Weight kg	3360	3369	3336	3346	3351	3350
Std	556	567	574	568	555	565
			Low birth weight			
2000-2001	10	11	12	1	2	3
<2,500 kg	0.04	0.05	0.05	0.05	0.05	0.05
=>2,500 kg	0.95	0.94	0.94	0.94	0.94	0.94
2005-2006	10	11	12	1	2	3
<2,500 kg	0.05	0.05	0.05	0.05	0.05	0.05
=>2,500 kg	0.94	0.95	0.94	0.94	0.94	0.94
			Mean number of gestation weeks			
2000-2001	10	11	12	1	2	3
Weeks	38.8	38.8	38.8	38.8	38.8	38.8
2005-2006	10	11	12	1	2	3
Weeks	38.8	38.9	38.7	38.8	38.8	38.8
			Number of gestation weeks			
2000-2001	10	11	12	1	2	3
Less than 29	0.01	0.01	0.01	0.01	0.01	0.00
30-35	0.04	0.04	0.04	0.04	0.04	0.04
37 or more	0.92	0.93	0.91	0.91	0.92	0.92
2005-2006	10	11	12	1	2	3
Less than 29	0.00	0.01	0.01	0.00	0.00	0.00
30-35	0.04	0.03	0.04	0.04	0.03	0.03
37 or more	0.93	0.93	0.92	0.92	0.93	0.93
			Birth order of the child and single birth			
2000-2001	10	11	12	1	2	3
1	0.47	0.48	0.48	0.47	0.45	0.46
2	0.35	0.34	0.34	0.36	0.38	0.37
3 or more	0.14	0.15	0.15	0.14	0.142	0.14
Single birth	0.98	0.97	0.97	0.97	0.97	0.97
2005-2006	10	11	12	1	2	3
1	0.48	0.47	0.48	0.46	0.46	0.46
2	0.35	0.35	0.34	0.36	0.36	0.37
3 or more	0.13	0.15	0.14	0.14	0.14	0.14
Single birth	0.97	0.98	0.97	0.97	0.97	0.97

Source: Authors' computations from annual Birth Registries.

Notes: Months 10, 11, 12, 1, 2, and 3 represent October to March. The total of percentage age may not sum to 100% because missing observations are excluded.

Graphical Appendix: **Figures of Local Linear Regression**

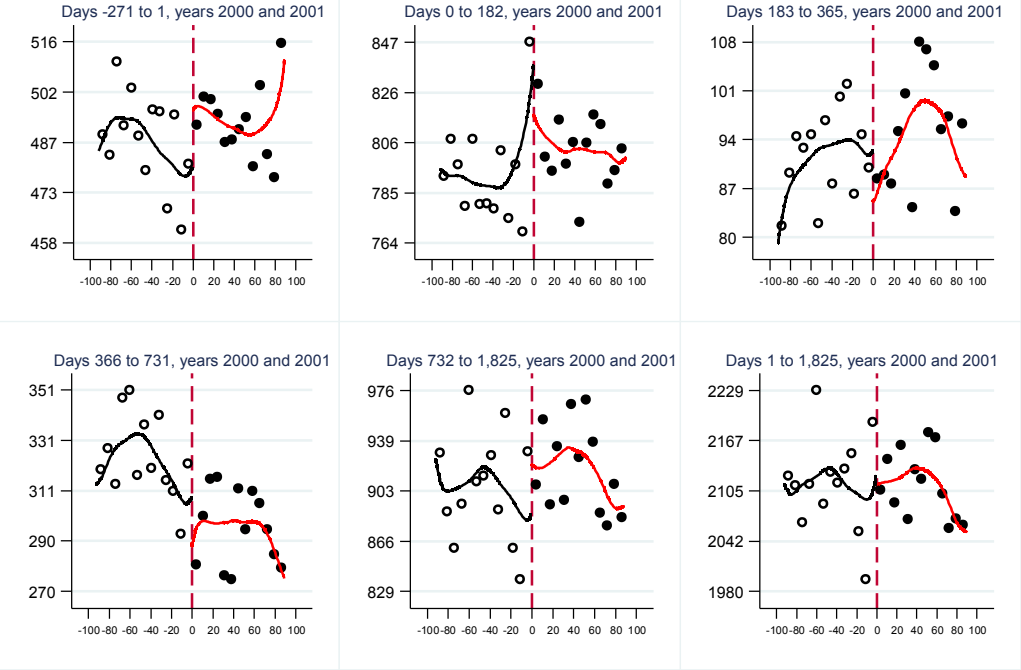
Each Figure presents "lowess" lines smoothing plots of the relationship between an outcome and a rating variable based on locally weighted regression. The points are the average of the outcome for a seven days bin based on the delivering day of the mothers. The dashed vertical lines indicate the policy change cut-off date (normalized to zero). The solid lines are estimated using a linear regression based on daily level data using triangular weights. The regressions are conducted by year and month and for six different time-spans.

The six time-spans:

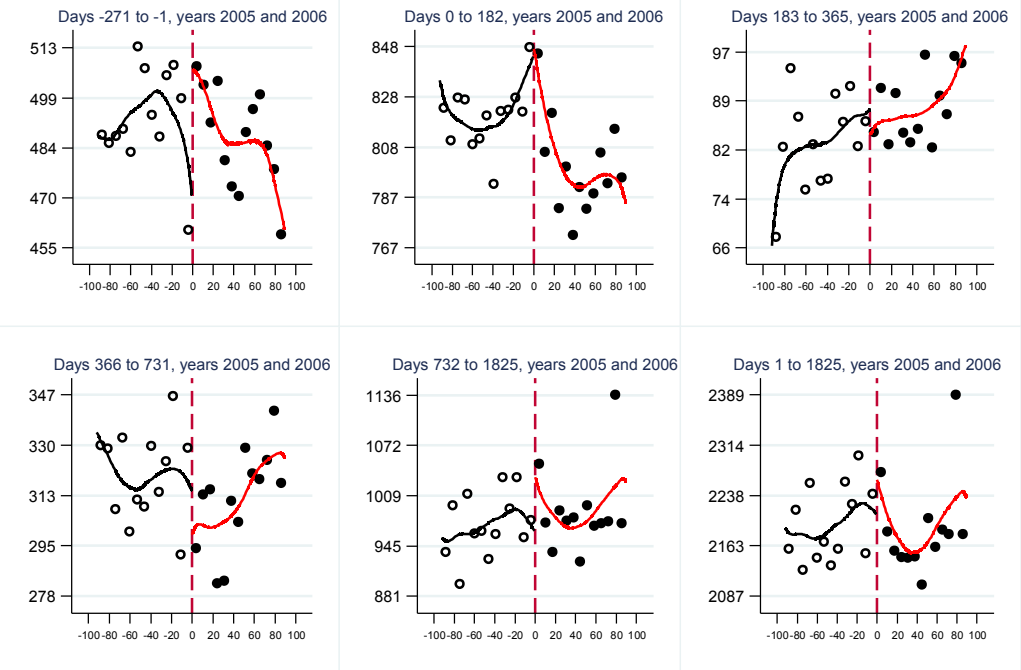
1. Days: -271 to 1
2. Days 0 to 182
3. Days 183 to 365
4. Days 366 to 731
5. Days 732 to 1825
6. Days 1 to 1825

The Years and Months:
2000-2001; months October-December and January-March
2005-2006; months October-December and January-March

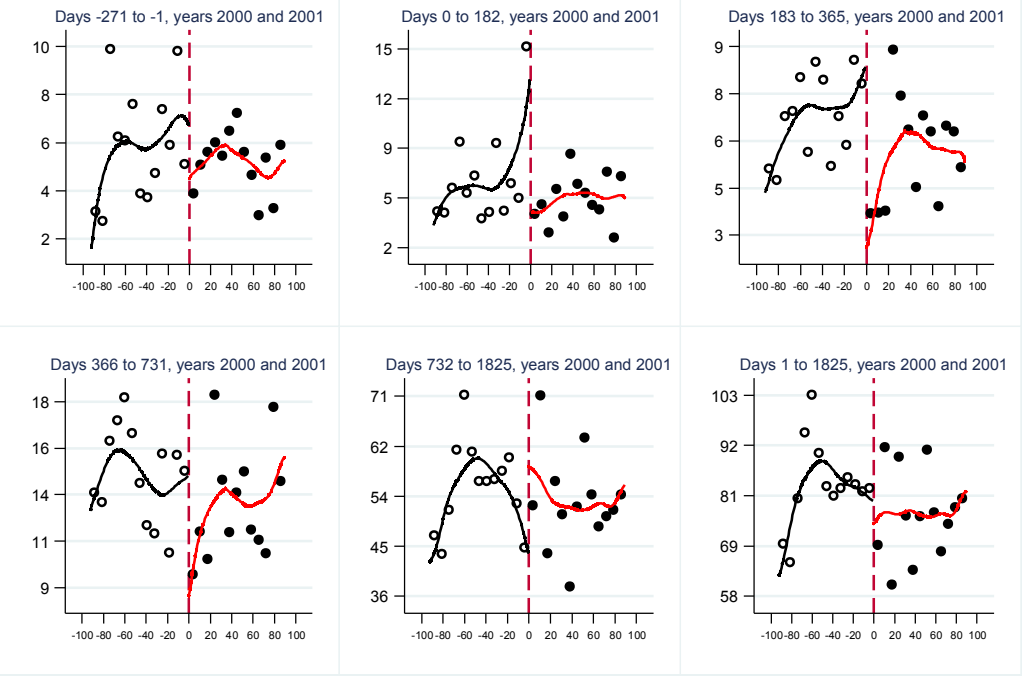
1A: Sum of Total Medical Fees (Costs) by Days and Years 2000-2001



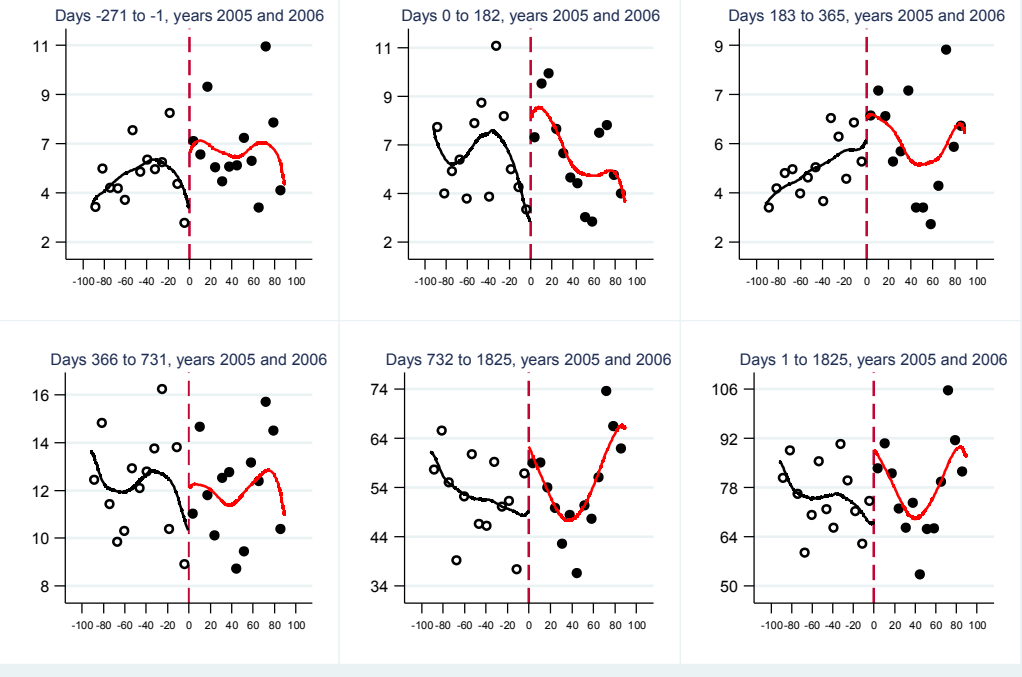
1B: Sum of Total Medical Fees (Cost) by Days and Years 2005-2006



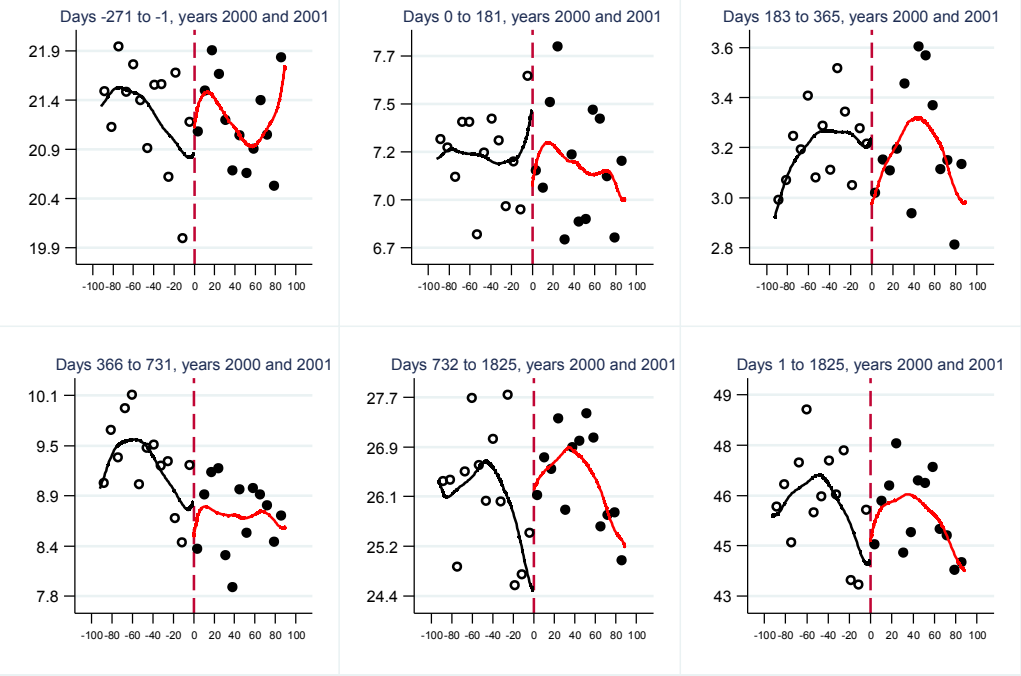
2A: Total Mental Health Fees (Costs) by Days and Years 2000-2001



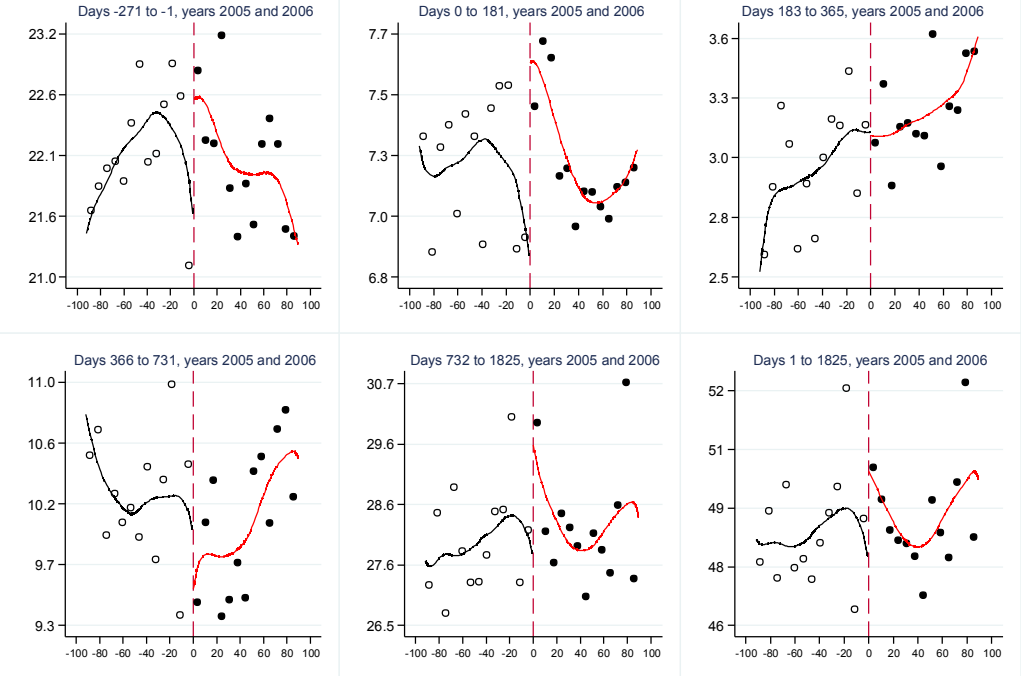
2B: Total Mental Health Fees (Costs) by Days and Years 2005-2006



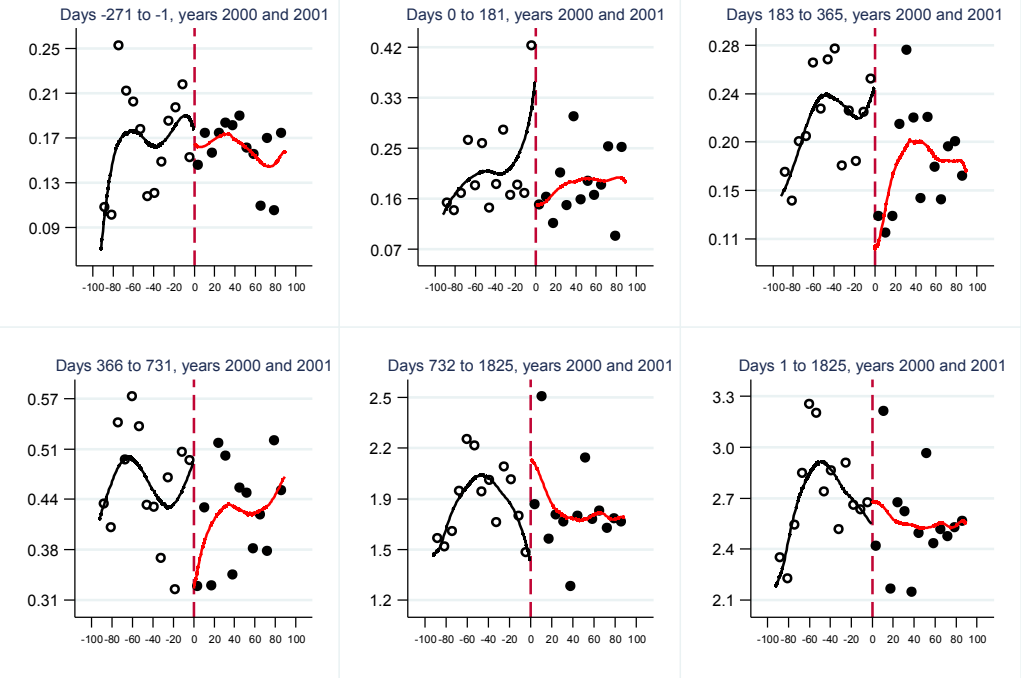
3A: Number of Total Medical Services (Acts) by Days and Years 2000-2001



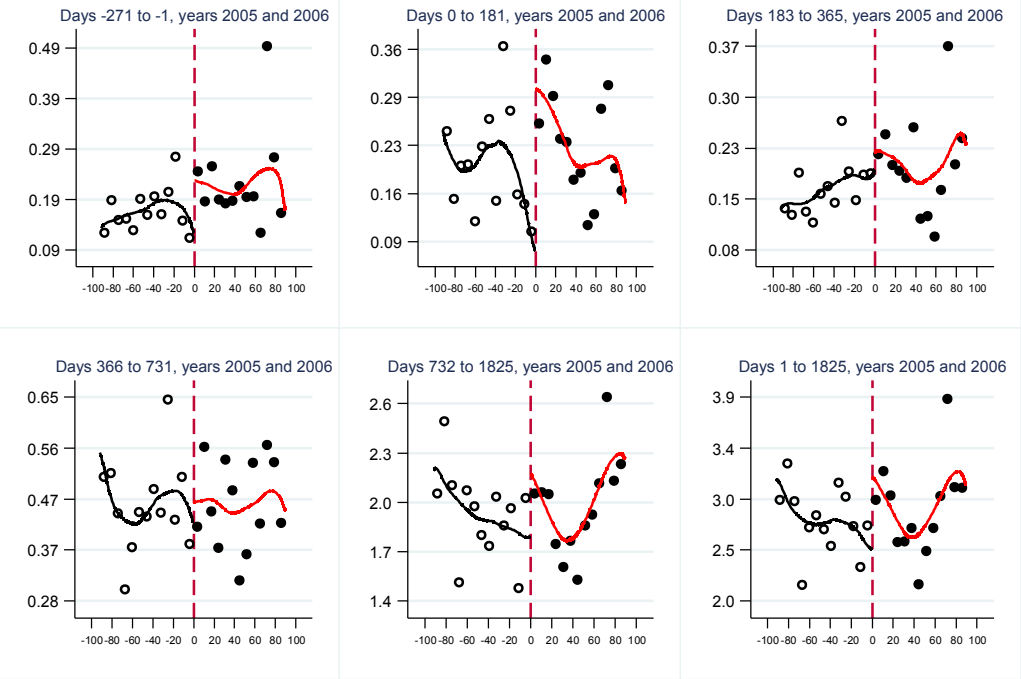
3B: Number of Total Medical Services (Acts) by Days and Years 2005-2006



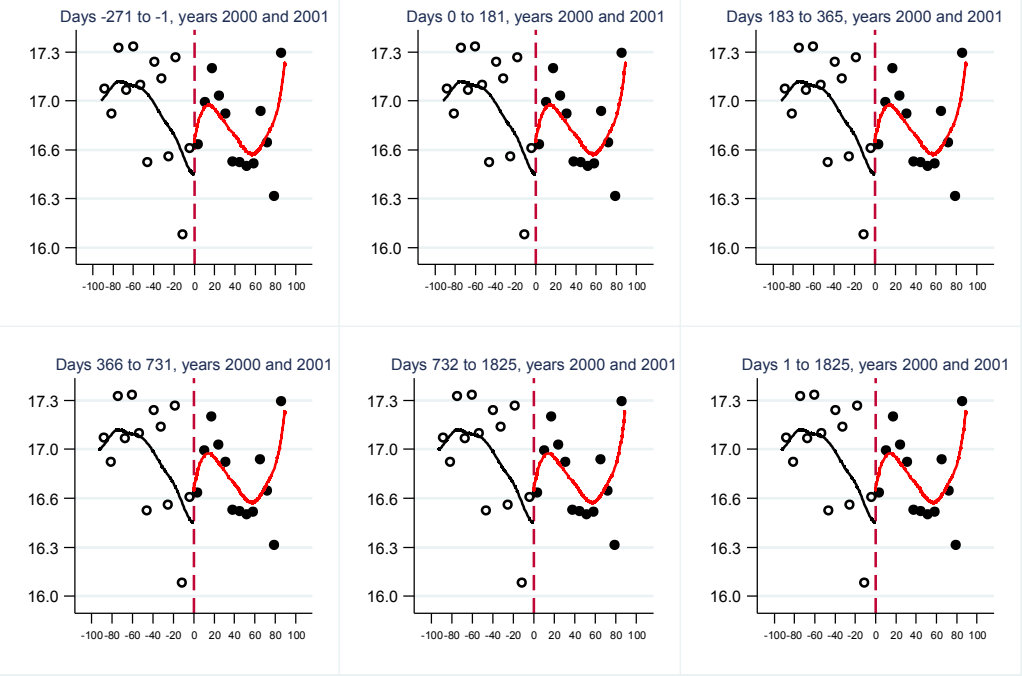
4A: Number of Total Mental Health Services (Acts) by Days and Years 2000-2001



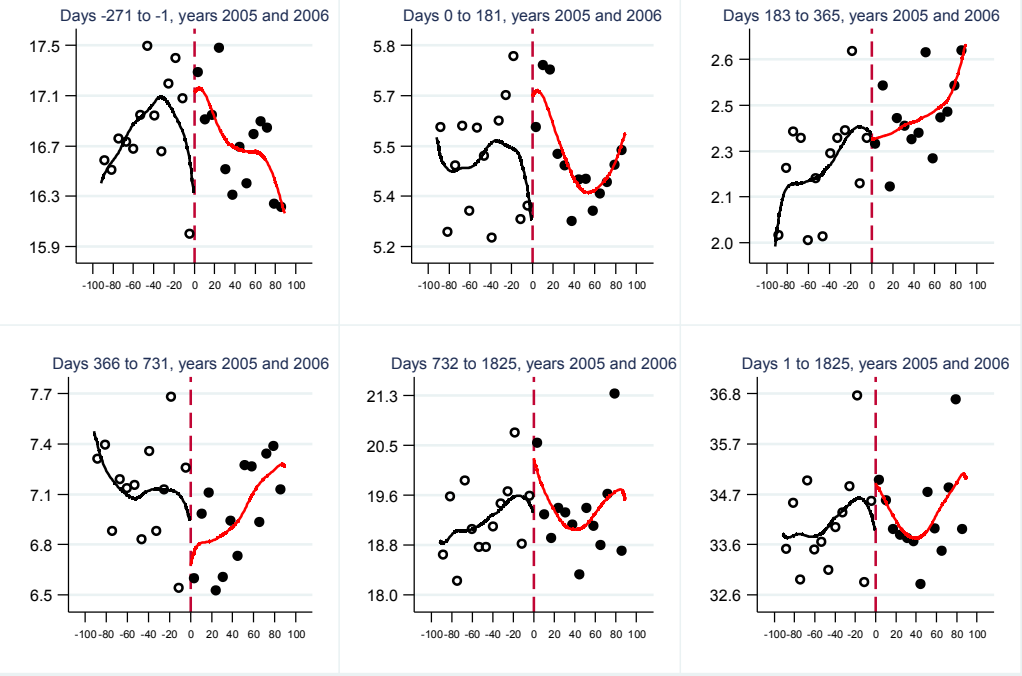
4B: Number of Total Mental Health Services (Acts) by Days and Years 2005-2006

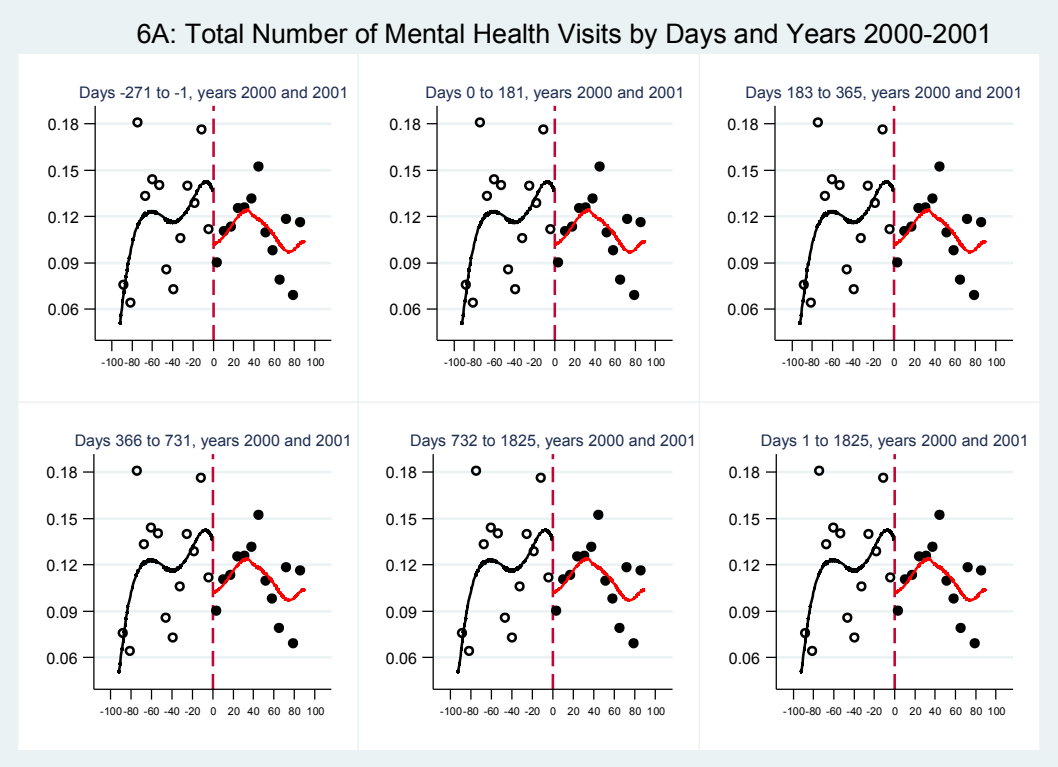


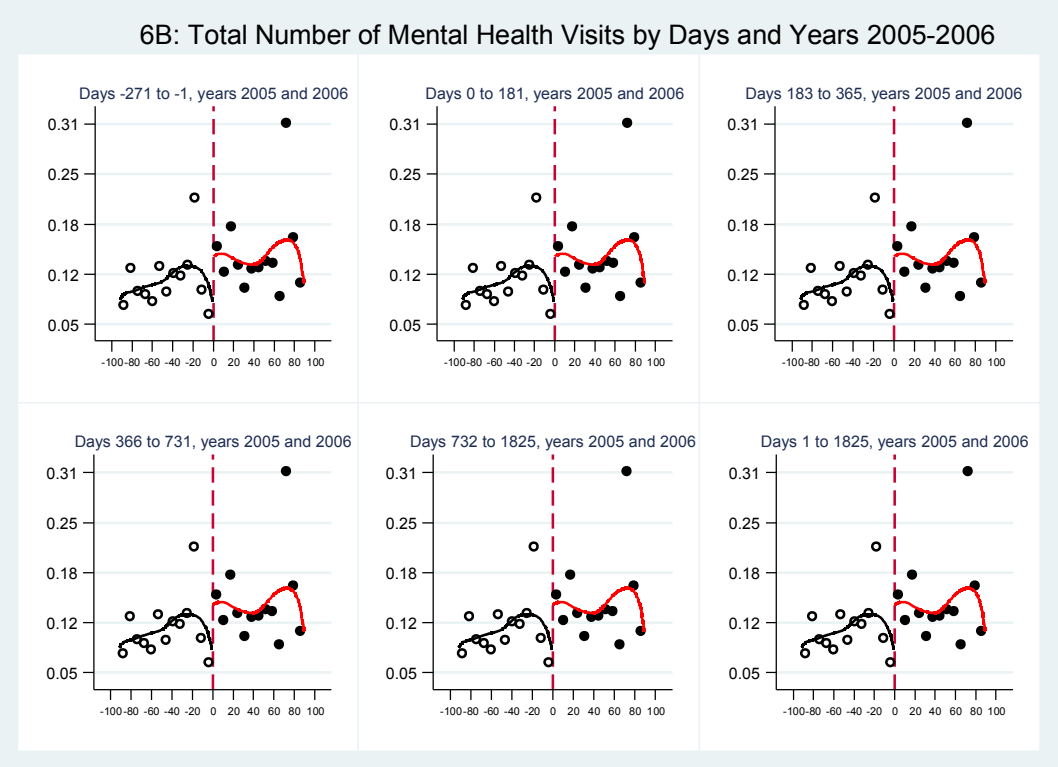
5A: Total Number of Medical Visits by Days and Years 2000-2001



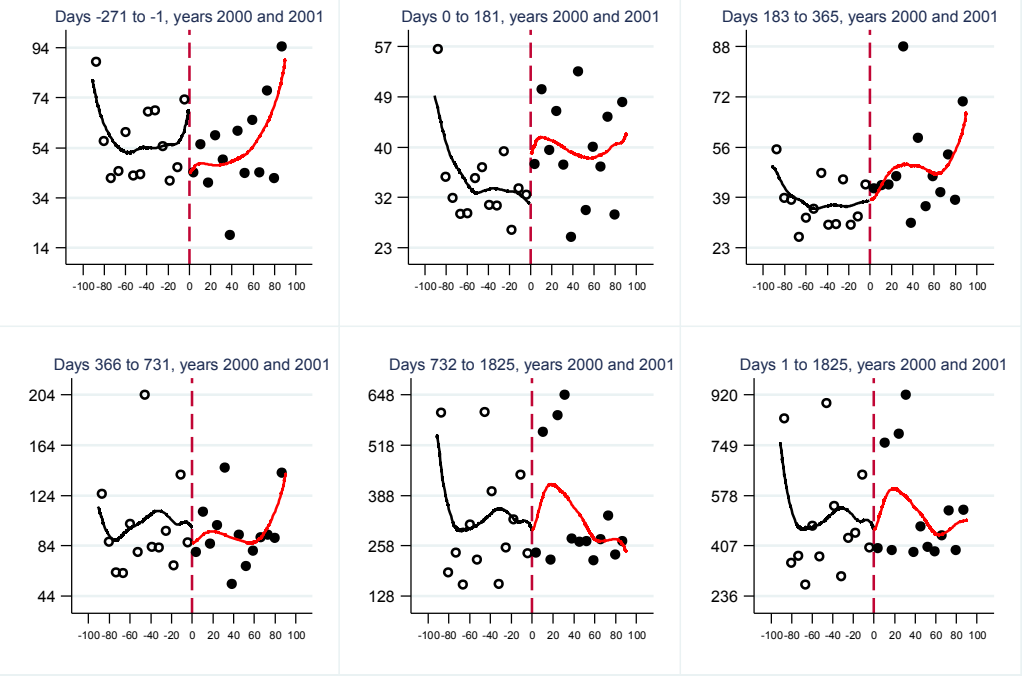
5B: Total Number of Medical Visits by Days and Years 2005-2006



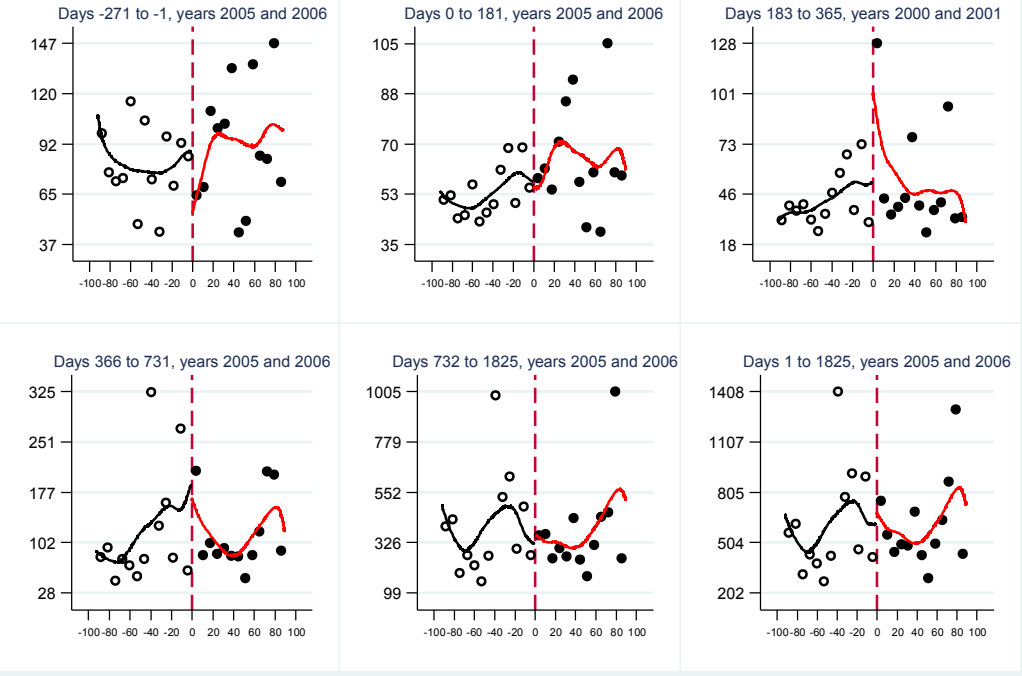

6A: Total Number of Mental Health Visits by Days and Years 2000-2001
Days -271 to -1, years 2000 and 2001
Days 0 to 181, years 2000 and 2001
Days 183 to 365, years 2000 and 2001
Days 366 to 731, years 2000 and 2001
Days 732 to 1825, years 2000 and 2001
Days 1 to 1825, years 2000 and 2001
0.18
0.15
0.12
0.09
0.06
-100 -80 -60 -40 -20 0 20 40 60 80 100


6B: Total Number of Mental Health Visits by Days and Years 2005-2006
Days -271 to -1, years 2005 and 2006
Days 0 to 181, years 2005 and 2006
Days 183 to 365, years 2005 and 2006
Days 366 to 731, years 2005 and 2006
Days 732 to 1825, years 2005 and 2006
Days 1 to 1825, years 2005 and 2006
0.31
0.25
0.18
0.12
0.05
-100 -80 -60 -40 -20 0 20 40 60 80 100

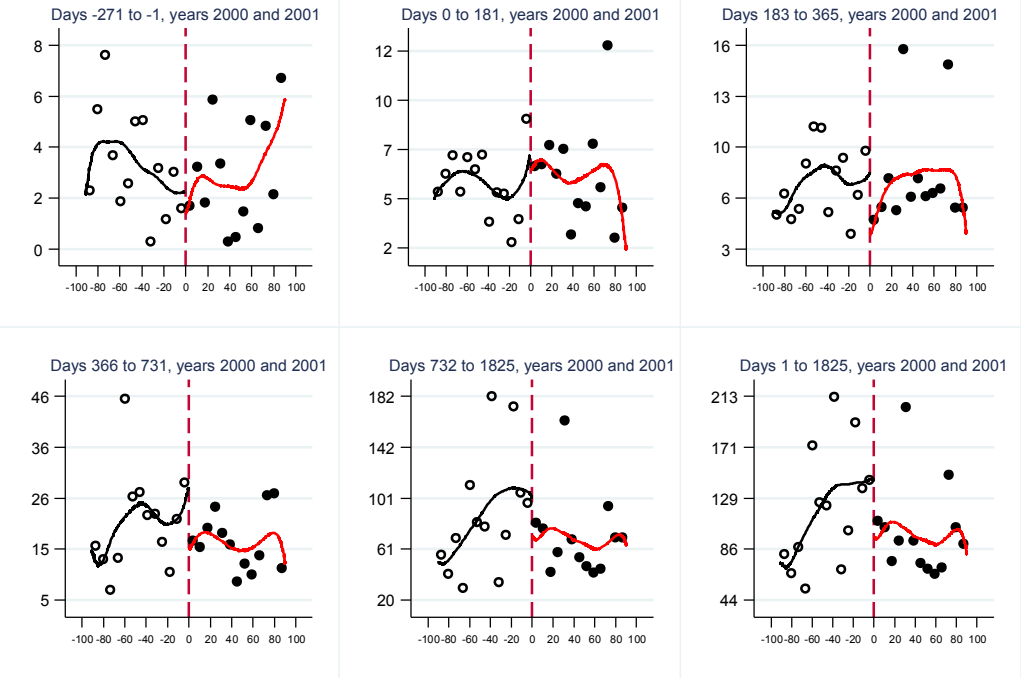
7A: Net Public Costs of all Prescription Drugs by Days and Years 2000-2001



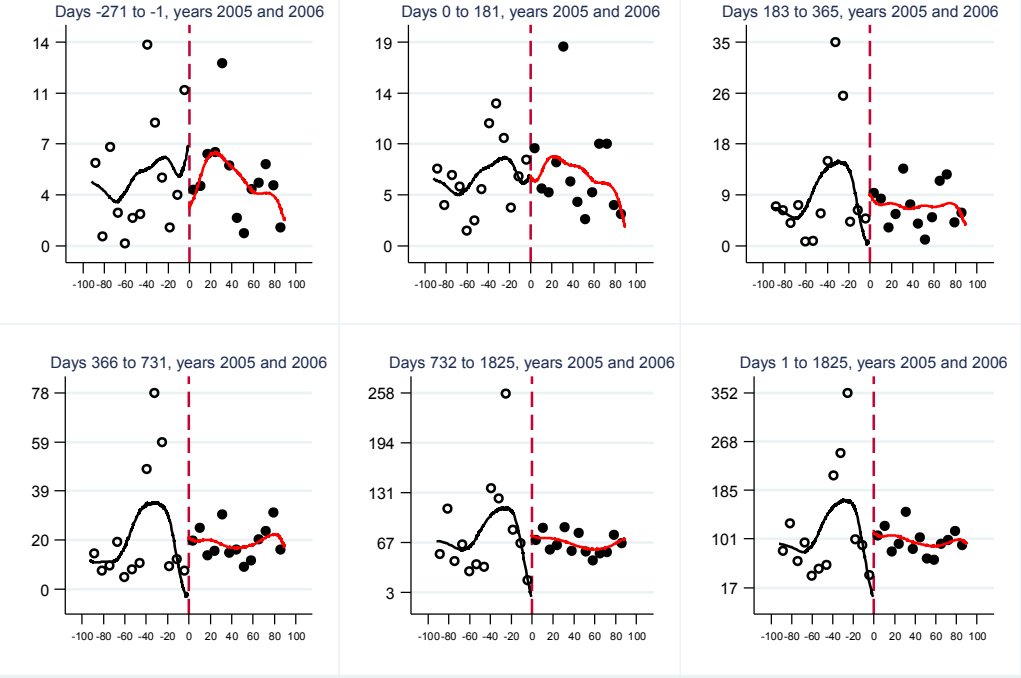
7B: Net Public Costs of all Prescription Drugs by Days and Years 2005-2006



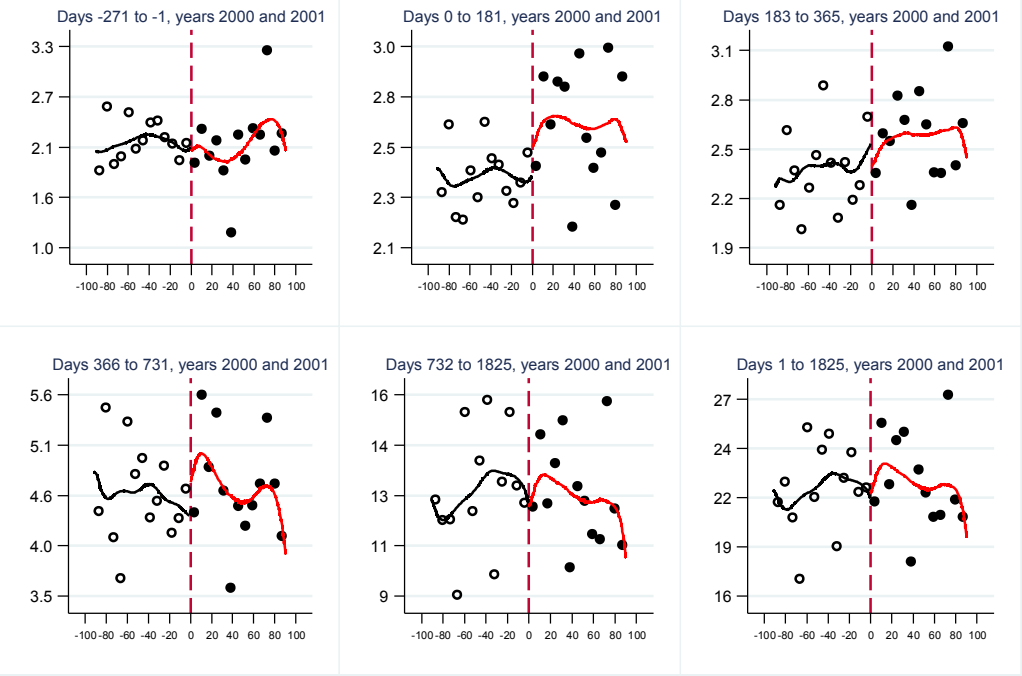
8A: Net Public Costs of Mental Health Prescription Drugs by Days and Years 2000-2001



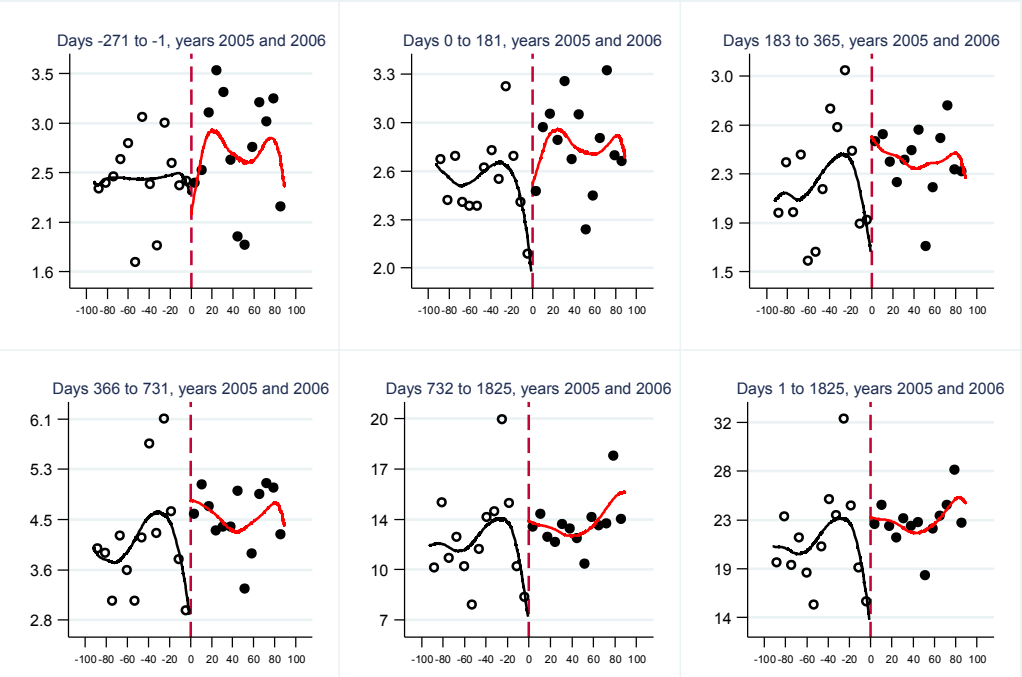
8B: Net Public Costs of Mental Health Prescription Drugs by Days and Years 2005-2006



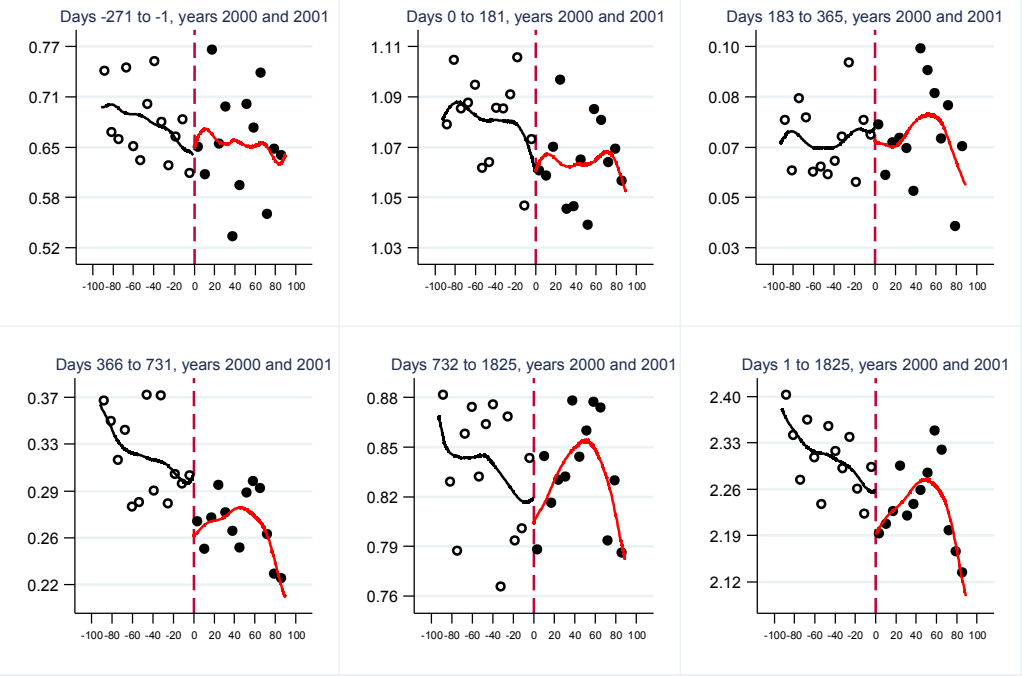
9A: Number of Total Prescription Drugs by Days and Years 2000-2001



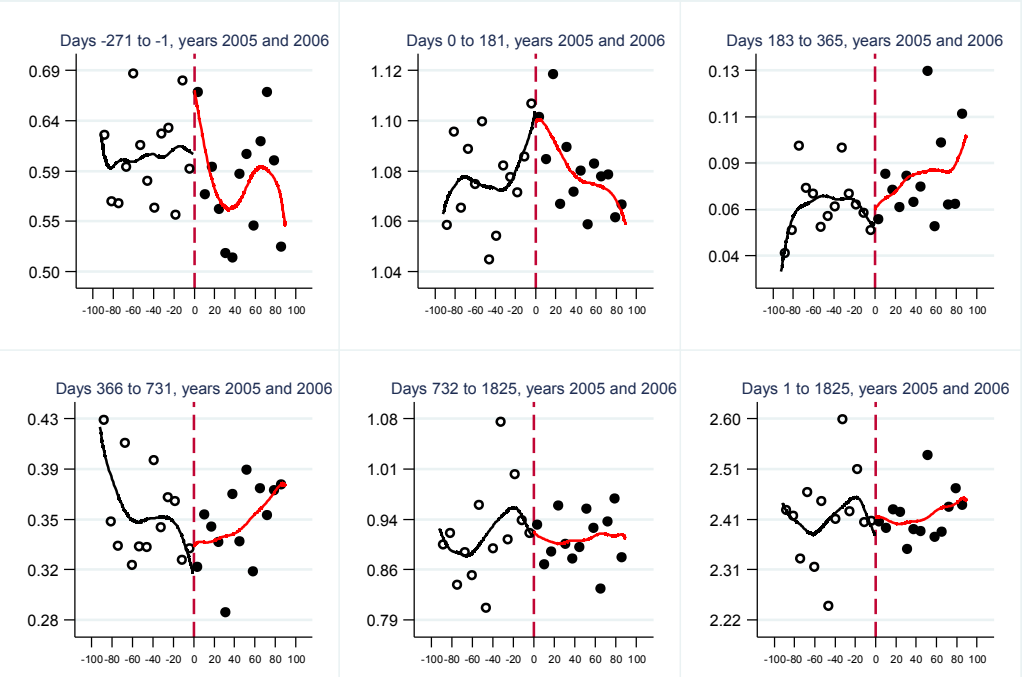
9B: Number of Total Prescription Drugs by Days and Years 2005-2006



10A: Number of Total Hospitalization by Days and Years 2000-2001



10B: Number of Total Hospitalization by Days and Years 2005-2006



The power of the purse: New evidence on the distribution of income and expenditures within the family from a Canadian experiment*

Catherine Haeck, Pierre Lefebvre and Philip Merrigan
Department of Economics, Université du Québec à Montréal

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Abstract

To increase mother's participation in the labour market and enhance child development, the Canadian province of Québec developped from 1997 a large scale low-fee childcare network. Previous studies have shown that the policy has significantly increased the labour force participation and annual weeks worked of mothers with children exposed to the program. Using Statistics Canada's annual 1997 to 2009 Survey on Households Spending we document the increase in the maternal share of total household income in Québec and use of instrumental variables approach to estimate the impact of the policy on intra-household expenditures. The results show that more income in the hands of mothers impacts the expenditures structure within the household by raising budget shares on expenditures related to children, family goods and services having a collective aspect.

JEL Classification: H42, J21, J22

Key words: childcare policy, mother's labor supply, intrahousehold expenditures, treatment effects, natural experiment

*The analysis is based on Statistics Canada's Survey of Household Spending (SHS) restricted-access Micro Data Files, which contain anonymous data. This research was funded by the Fonds québécois de la recherche sur la société et la culture. We are very grateful to Pierre-André Chiappori for his insight on lack of commitment characterization of household behavior and suggestions. For helpful comments we would also like to thank participants and discutants at a number of economic Meetings (SCSE, CEA, JMA).

1 Introduction

For the last three decades, economic research on household choices has focused on modelling intra-household allocation within a bargaining framework adopting the 'collective' approach whereby household members reach agreements (or bargain) on a sharing rule that determines monetary transfers between members of the household. Then, each member chooses his or her consumption and leisure subject to their own budget constraint partly defined by the sharing rule (Chiappori, 1988, 1992 for this landmark modelling). Any variable[1] that changes the bargaining power of household members may have an impact on household choices.

Numerous empirical studies in developed and developing countries show that household members do not pool income They also show that the share of income held by each spouse, when total income or expenditures is held constant, impacts the intra-household allocation process. However, Lundberg, Pollak and Wales (1997) argue that earnings are endogenous with respect to the household's allocation decisions implying that an instrumental variable approach should be used when estimating the impact of, for example, the share of female income in the household on the allocation of resources within the family.

This paper contributes to the empirical literature on the influence of women's bargaining power on household expenditure patterns. We use a policy experiment in Québec, the second most populated province in Canada, that considerably lowered the price of childcare for young children, to create instruments and properly identify the impact of the share of female income in the household on the share of consumption goods in total spending for households with children. Using Statistics Canada's annual Survey of Household Spending (SHS) spanning the years 1997 to 2009, we demonstrate that this important daycare policy substantially increased the female share of total income within household's with young children. Then, using the policy as an instrument, we estimate by GMM, the impact of the mother's share of income on expenditure shares for categories of goods and services that are related to children's well-being and development (for example health, educational expenditures) as well as sinful goods such as games of chance tobacco or alcool. The results provide unbiased evidence on the influence of a universal childcare policy on expenditure shares related to children and the collective functioning of the family through of a change in the bargaining power of mothers. Falsification exercises produced with couples without children as well as couples with older children not affected by the policy provides further enhances the validity of our approach.

The paper is structured as follows. Section 2 presents the low-fee childcare policy, childcare use and arrangements from 1997 to 2012 while tracing the unique evolution of Québec among Canadian provinces in this regard. Section 3 briefly reviews the main principles and

[1] These are so-called 'distribution factors' which are distinct from socio-demographic factors.

results from collective household models. Section 4 lays out the estimation strategy. Section 5 describes the data set, samples, and variables used in the analysis. It also describes the stylized facts on income shares within the household and the labor supply of mothers and fathers from 1997 to 2009. Sections 6 and 7 present respectively the main results and some falsification exercises. Section 8 concludes the paper.

2 Québec's childcare policy

On September 1^{st} 1997, all licensed and regulated childcare facilities (not-for-profit centres, family-based daycare and for-profit centres) under agreement with Québec's Ministry of the Family and Elders started offering spaces at the reduced contribution of \$5 per day per child, for children aged 4 on September 30^{th}. On September 1^{st} 1998 and on September 1^{st} 1999 respectively, the 3-year-olds and 2-year-olds (on September 30^{th}) became eligible for low-fee spaces. On September 1^{st} 2000, all children aged less than 5 years of age (if not age eligible for kindergarten) became eligible for low-fee spaces.[2] The government progressively increased the number of subsidized \$5/day childcare spaces every year since then. The total number of partly subsidized spaces in the network increased from 78,864 in 1997 to 133,250 in 2001 when all children under 5 became eligible for low-fee a low-fee space. In 1997, none of the spaces were at the low fee of \$5/day, while most regulated spaces were "low-fee" by 2001. By March 2012, the number of regulated spaces reached 245,107 (with 89% "low-fee"). This represents a 211 percent increase over the 1997-2012 period.[3] Figure 1 shows the evolution of the number of regulated spaces from 1994 to 2012.[4]

Because the number of spaces increased over time and the entry age decreased between 1997 and 2000, not only did the number of children benefiting from low-fee childcare increased, but also did the average number of years children spent in low-fee childcare or any type of care outside the home. In 2000, 39% of all children aged 1 to 4 were in low-fee childcare services, 47% in 2002, 56% in 2004, 61% in 2006, and 59% in 2009.[5] Haeck et al. (2014) also show that the participation rate in child care increases with the age of the

[2] For children aged 5 on September 30^{th} 1997, full-day instead of part-day kindergarten was offered by all School Boards across the province. Kindergarten is not compulsory but if a child is enrolled in a public school, he or she must attend class for the full school day and school week. All provinces offer publicly provided free kindergarten for 5-year-olds in a school setting under the auspices of the Ministry of Education. New-Brunswick, Nova-Scotia, and Québec (since the fall of 1997), offer full-time kindergartent, while in other provinces kindergarten is offered half-day (2 hours and 30 minutes)during the period of our study. Haeck et al. (2013) show that the kindergarten policy by itself did not have an impact on the labor force participation of mothers, but the combination of the low-fee daycare program and full-day kindergarten did.

[3] All statistics are from Haeck et al. (2013) who present additional information on the childcare policy..

[4] Information on the number of low-fee spaces is only available as of 2001. As such, it is not possible to present the evolution of the number of low-fee spaces between 1997 and 2001.

[5] Families who do not have a low-fee space can use 'private' childcare and benefit from the Québec's generous refundable childcare credit and the federal government tax deduction for childcare.

child and that the number of hours spent in childcare conditional on attending childcare also increased over the period. This may be attributed to the long opening hours of the low-fee childcare centers. In the Rest of Canada (RofC, hereafter for the other provinces) there was no such major change in the childcare policy (Haeck et al. 2014).

The policy pursued two major objectives: to increase mothers' participation in the labor market and to enhance child development and equality of opportunity. Studies on the Québec childcare reform show that it had a significant positive impact on the labor supply of the mothers of eligible children in Québec. Lefebvre and Merrigan (2008) use annual data from 1993 to 2002, drawn from Statistics Canada's Survey of Labour and Income Dynamics (SLID), with a sample of Canadian mothers with at least a child aged 1 to 5, and estimate a substantial effect of the policy on a diversity of labor supply indicators (participation, labour earnings, annual weeks and hours worked). In 2002, the effects of the policy on participation, earnings, annual hours and weeks worked of the childcare policy are estimated to be respectively between 8.1 and 12 percentage points, \$5,000-\$6,000 (2001 dollars), 231 to 270 annual hours at work, and 5 to 6 annual weeks at work. Baker et al. (2008) using the first two cycles (1994-1995 and 1996-1997) and the last two cycles (2000-2001 and 2002-2003) then available of the National Longitudinal Survey on Children and Youth (NLSCY), also provide evidence of a substantial effect of the policy on mothers' employment and non-parental childcare use. Finally, Lefebvre, Merrigan, and Verstraete (2009), with annual data from the SLID (1996 to 2004), using a triple difference approach find that the program had substantial dynamic labour supply effects on mothers in Québec, in particular for cohorts of mothers who had a high probability of receiving subsidies from the child's birth to his or her fifth birthday.

Therefore, since 2000, labor supply and earnings of mothers with children 0 to 11 have substantially increased in Québec relative to the RofC. We show below that this translated into an increase in the share of female income in the household in Québec relative to the RofC. This exogenous variation allows us to estimate the impact of the share of female income on consumption shares in the household.

3 Collective household behaviour

Several public policies, in developed and developing countries, use targeted benefits to specific family members, in particular mothers, to promote specific outcomes, in particular for children. Also, a large number of studies in the last decade have shown that investing in young children may be the best strategy to enhance their well-being and skills (cognitive, social, behavioral, health) while reducing disparities among young adults (Cunha and Heckman, 2010; Almond and Currie, 2011).A Lundberg and Pollak (1996) resume our state of knowledge on these topics in the mid 90s:

"The most provocative within this brand of empirical work demonstrates a strong positive association between child well-being and the mother's relative control over family resources and has raised new questions about the potential effectiveness of policies 'targeted' at specific family members... However, no new theoretical framework has gained general acceptance as a replacement for common preference models, and empirical studies have concentrated on debunking old models rather than on discriminating among new ones." (p.140)

The first assertion has been illustrated in numerous empirical studies, pointing to the fact that each spouse has a different impact on household decision making. Among the most cited studies, Lundberg, Pollak, Wales (1997) use the change in the UK child support system which resulted in benefits being paid to the mother instead of the father (a shift 'from the wallet to the purse'). They show that this policy led to significant increases in the share of expenditures for children's clothing and women's clothing over the share of expenditures for men's clothing.[6] Bourguignon, Browning, Chiappori, and Lechene (1993, 1994), using French and Canadian data on consumer spending, as well as Phipps and Burton (1998) with Canadian data, show for couples working full-time without children that relative spouses' income has a significant impact on intra-household expenditures.

In developing countries, Thomas (1990), Schultz (1990), Hodddinot and Haddad (1995) for example, present empirical evidence that **income** and the female's share of non-labour income within a couple (women's share of cash income, or wealth at marriage) have a significant impact on children's health, fertility or food shares, as well as alcohol and tobacco expenditures (Brazil, Indonesia, Côte d'Ivoire). Duflo (2003) obtains a similar qualitative effect evaluating a South African reform of the social pension policy, which extended benefits to a large population of black individuals (in particular grand-mothers). This windfall generated improvements in child nutrition which depended on the gender of the recipient. Similar findings are found for the Mexican 'Progresa (Oportunidades) program' (and its other Latin America counter parts), a subsidy program that provides educational grants to the poorest families in rural Mexico **if mothers insure their children go to health clinics and attend schools** (Behrman et al. 2011; Behrman 1997)**.** Such findings have potentially crucial normative implications on the design of aid policies, social benefits, taxes, and other aspects of public policy.

Their second assertion on modelling no longer holds: the collective barganing approach has become a mainstay in labor economics (see Chiappori and Donni, 2010). These models assume that income shares within the household are the result of a bargaining process, that intra-household decisions are Pareto-efficient and that each member of the household maximize their own utility subject to their own individual budget constraint. The share of

[6] Ward-Batts (2008) uses the same quasi-experiment to provide evidence that demand for male tobacco products (pipes and cigars) decreased because of the policy.

income for each member will depend on their respective bargaining power

Critical and relevant to this paper, Mazzocco (2007) explains that in a life-cycle setting with commitment between members of the household, no policy will be effective in changing bargaining power within the household, but the contrary is true in the absence of commitment. Estimate of a life-cycle collective model strongly rejects commitment, thereby rendering feasible policies that seek to affect bargaining power within the household. In line with Mazzocco, we suppose that the cross-sectional families of the SHS surveys we use for estimation are characterized by lack of commitment. Browning, Chiappori, and Weiss (2011) discuss extensively the importance of commitments (how much to invest in children, how much to consume each period, the proportion of family assets that each partner would receive upon divorce) made at the time of marriage to attain efficient investment and consumption outcomes. They also argue (p. 270) that Mazzocco's findings indicate that cross-sectional and longitudinal variation in the relative decision power of household members explain a part of the sensitivity of consumption to income shocks. Our basic assumption is tha the child-care universal policy is an exogenous variation impacting the labor supply of mothers (not fathers) and therfore the income share of mothers within the household. The policy. acts as a 'distribution factor' providing more power to mothers over household allocations and to express their differences in preferences). This exogenous redistribution of income within the household permits the identification of the effect of income shares on consumption shares in the household.

4 Empirical estimation strategy

A non-experimental evaluation framework based on multiple pre-and post-treatment periods is used to estimate the policy effects on the share of female income in the household in the first step of our two-stage strategy. Formally, the first-stage regression is given by:

$$M\_Share_{it} = \alpha + \beta_1 QC_{it} + \beta_2 Post_{it} + \sum_{t=2001}^{2009} \gamma_t QC_{it} * D_{it} + \Phi' X_{it} + \varepsilon_{it}, \qquad (1)$$

where M_Share_{it} represents the mother's income share for household i in year t. The term QC_{it} takes the value of 1 if household i lives in Québec in year t, and otherwise takes the value 0. $Post_{it}$ is a dummy variable indicating the post-treatment period for the main sample, representing the effect of a post-policy aggregate effect common to both regions. The terms γ_t represent the effects of the policy over time as the QC_{it} dummy is interacted with year dummies, D_{it} $(t = 2000, ..., 2009)$. These post-policy period interaction dummies are the instruments of the model. The effect of the reform is differentiated over time as additional subsidized spaces were added to the daycare network in Québec over this period. The term

X_{it} is a vector of socioeconomic control variables and Φ is a vector of parameters. Finally, ε_{it} is an i.i.d. error term.

The decision on pre-reform and post-reform periods as well as the age groups of children potentially eligible to low-fee childcare determinates the choice of instrumental variables (post-policy interaction dummies).[7] As of September 1997, the only beneficiaries of the policy were families with a 4-year-old child already in child cared in the regulated network. As such, it is unlikely, however, that the policy impacted families' labor force behavior or expenditures at the dawn of its implementation (Haeck et al. 2013 for evidence). Each September after 1997 until September 2000, the age eligibility for low-fee childcare widened from age 4 to ages 0-1 in 2000. However, very few new subsidized childcare spaces were created in 1998 and 1999, although private providers joined the regulated network and thus began asking \$5/day for children already in childcare. The addition of new low-fee spaces really took off in the middle of 1999 (spaces are created every month) and large yearly increases in spaces persisted until 2006. Thereafter, new spaces were added at a much lower rate. Since the SHS reports yearly expenditures, our pre-reform period ends in 2000.

The second stage regressions fits expenditure shares on the predicted M_Share_{it} and exogenous variables.

$$C\_Share_{kit} = \beta_1 + \beta_2 \widehat{M\_Share}_{it} + \beta_3 QC_{it} + \beta_4 Post_{it} + \theta' X_{it} + u_{it}, \tag{2}$$

where C_Share_{kit} represents the share of expenditures for good k in family i in year t.

As for socioeconomic control variables, we retained the mother's age and age squared, the number of children aged 0-4, 5-14, and 15-19 years, the total number of children in the household, seven categories for the size of the area of residence, total real household expenditures, a common linear trend, as well as provincial dummy variables for provinces otehr than Québec.

5 Data and variables

Data and samples Our data are extracted from Statistics Canada's SHS for the years 1997 to 2009, a yearly survey with a cross-sectional design collecting detailed information on household annual expenditures.[8] The survey contains detailed information on expenditures

[7] In the early years of the program, already available spaces were converted to \$5/day spaces but no new spaces were created. During that period, the labor supply of mothers was not impacted by the policy.

[8] The target population is the population of Canada's 10 provinces, excluding residents of institutions (e.g. prisons, hospitals) members of the Canadian Forces living in military camps and people living on Indian reserves. In all, these exclusions make up about 2% of the population of the 10 provinces. Conducted since 1997, the Survey of Household Spending integrates most of the content found in the Family Expenditure Survey (FAMEX) and the Household Facilities and Equipment Survey. The preceding survey, FAMEX, was

for consumer goods and services. Annual samples of approximately 15,000 households (except for the 2008 and 2009 surveys which provide approximately 10,000 households) also provide information on the annual income of household members (extracted from individual tax retourns, in a majority of cases), on some demographic characteristics of the household, on dwellings (e.g., type, age and tenure) and household equipment (e.g., car, appliances, electronics and communications equipment).[9] Because the SHS is designed principally to provide detailed information on non-food expenditures, only an overall estimate of food expenditures is recorded in the survey as well as expenses for food purchased from stores and food consumed outside the home which are recorded separately.

For the purpose of this study, our main sample is restricted to households, where both spouses are present and who have at least one child less than 15, and with the female spouse aged 20 to 51.[10] Fathers are between 20 and 60 years old (to exclude most students and pensioners). The selection leaves us with 5,160 couples with at least one child aged 0 to 14 in Québec and 33,489 similar couples in the RofC for the period of 1997 to 2009. The main purpose of these restrictions is to perform regressions on similars households in Québec and the ROf C those in Québec potentially affected by the policy dummies.

Dependent and explanatory variables The SHS groups expenditures for individual items into a large number of categories which are then further aggregated into 14 broad groups of goods and services: expenses incurred during the survey year for food (in stores, and in restaurants or take-out settings), shelter, household operations, household furnishings and equipment, clothing, transportation, health care, education, personal care, recreation and leisure goods and services, reading materials, tobacco products and alcoholic beverages, games of chance, and a miscellaneous group of items. The sum of these 14 categories is considered as total current consumption (that is excluding personal taxes, personal insurance payments and pension contributions, as well as gifts of money and contributions to persons outside the household). The definition of the categories are presented in Table A.**??** We deleted from some categories, items that can be considered as durables, and infrequent or very selected expenditures. Regressions were performed for categories of goods we consider to be separable from leisure, so that leisure should theoretically not have any direct impact on consumption shares for these specific goods. For example, clearly transportation is not

conducted every four years; the last one was conducted in 2006.

[9] Definitions of the majority of variables used in this study remained unchanged over the years 1997-2009. See Statistics Canada (http://www.statcan.gc.ca/pub/62f0026m/2012002/change-eng.htm#a6) for changes since year 2010. The SHS combines two collection methods (recall periods based on the type of expenditures and a daily expenditure diary that the household completes during a two-week period following the interview). The master file of the 2010 SHS was not available at the time of this research.

[10] To minimizes the number of spouses who may be a studeunt. Throughout the term spouse refers to cohabitees as well as married partners.

separable from leisure, as one has to get to work somehow ans this generally involves expenditures. Therefore, we choose the following items, education, health, clothing, lotteries or games of chance, tobacco and alcool, and furniture. The large clothing category can be examined for three groups by specific gender and age of household members: total clothing expenses for children less than 5, for women and girls aged 5 or more, for men and boys aged 5 or more. We deflated total current consumption and the specific expenditure categories by province specific price indexes ($2001) constructed by Statistics Canada. Third, we computed expenditure shares (expenses in a category of spending over total current consumption, the latter defined by the aggregation of all expenditures in all categories) for each household.

Like many other household traditional expenditure surveys, the SHS does not contain information on the specific expenditures made by different members of the household (except clothing by sex). There is no information available on wage rates, hours or work, and no assignable commodities to members of the household, but only spouses income and household expenditures (some with a private component and other with collective characteristics) are available. Also, the SHS has limited information on household sources of income and labour market activities. Four variables measure the annual income of each spouse and of the household, they are: 1. total income from earnings (paid work, net income from self-employment, and income from roomers and boarders); 2. total income from investments; 3. total income from transfer payments by the governments; 4. and, total income from other sources. Only three labor supply measures are available: number of weeks worked full-time and part-time by each spouse, and employment status during the survey year (grouped into three categories working full-time, part-time, and not working).[11] Thus, hours of work and hourly wages are not derivable from the information included in the data set. Our measure of the bargaining power within the household (the 'distribution factor') is defined by the ratio of the mother's income over total income accruing to the two spouses.[12] We use demographic characteristics of the household as control variables. These are age of the spouses, the population size in the area the household resides; the exact number of children by age group (0-4, 5-14, 15-19), and the age of the youngest child.[13]

[11] Full-time if weeks worked full-time plus part-time weeks>= 49 and full-time weeks >= 25; part-time: if weeks worked full-time plus part-time weeks = 1 to 48 weeks worked full-time weeks plus part-time weeks >= 49 and full-time weeks < 25; did not work if full-time weeks plus part-time weeks = 0. Maximum value of weeks worked is 52.

[12] Since the selected households all have rather young children, the gap between household total income and total income of both spouses is small.

[13] Beginning with year 2004, the age and sex of each child, the highest level of education attained by each spouse as well as if a spouse has a disability are provided with the master files, but these years are all in the post-reform period.

Descriptive statistics and stylized facts on labour supply Figure 2 and Table A.1 (columns 1 and 3 to 5) display three important features of annual weeks worked. First, a large proportion of mothers do not work (column 5); when they do, however, the range of weeks that they supply over time is rather large (column 1).[14]

Second, it is well known from other surveys (e.g. Labour Force Survey) that working mothers with young children in Québec work full-time compared to similar mothers in the RofC (from columns 1 and 3). Patterns of full-time and part-time weeks worked are shown in Figure 2. The latter is rather flat for both regions. More importantly, the divergence in the evolution of labor supply for mothers between Québec and the RofC can be observed for full-time weeks beginning in 1998 (the first full year of the low-fee policy for the 3 to 4-year-olds but with no creation of new childcare spaces). The gap increases over the years as the policy is fully implemented and new childcare spaces are added each year. In 2007 and 2008, the percentage of Québec mothers working 52 full-time weeks was respectively 40 and 45 percent as compared to 36 and 33 percent for mothers in the RofC (Table A.1 column 1). In Québec, the evolution of mothers' labor force status has as also changed considerably compared to mothers in the RofC (Table A.1 columns 3-5), in particular since year 2000: a larger percentage works full-time and a lesser percentage is not working; in the RofC, although a large proportion is attached to the labor market, the percentage not working has not changed over time. Years 2008 and 2009, however, show that the financial crisis may have impacted labor force behavior.

Third, most fathers work full-time, on average 45 weeks per year, with marginal variations over time except in 2009 (statistics not shown in Figure 2). Part-time work or not working, Table A.1 (columns 1 and 6 to 8) , are the choice of few fathers. There is no discernable trend over the years, except for a small drop in participation corresponding to the financial crisis in 2008 and 2009. As to the number of weeks worked (Table A.1), few fathers do not work full-time. The spread in weeks is much smaller than for mothers, and a large proportion works all 52 weeks of the year.

Figure 3 illustrates the potential impact of the childcare policy on the economic importance of mothers for family expenditures. We show for both regions the average share of mothers' income and her average share of earnings over time for both regions. In Québec, there are large increases in mothers' total income shares folowing the year 2000, which can be linked to the raise in earnings due to the childcare policy. For the RofC mothers, the earnings'share is flat from 2001 to 2008. The exception is year 2009, where mothers seem to have coped with the financial crisis by working additional weeks as many fathers lost their jobs and were likely constrained in their number of full-time weeks worked (see Figure 2 and

[14]For example, in year 1997, 47 percent of Québec's mothers do not week, 30 percent work 52 weeks and the rest, 27 perecent, work part-time between 1 and 52 weeks.

Table A.1). Clearly, the figures show that the mothers'share of income has been positively affected by the childcare policy.

Table A.2 displays descriptive statistics for the main sample (families with a youngest child aged 0 to 14) used for the estimation, by region.[15] We observe that families on average are very similar in terms of the control variables that will appear in the regressions (age of the mother, of the father, household size, and the size of the area of residence). The main differences are in the mean number of children in the two age groups, and evidently the mothers' share of income in family income.

Finally, we constructed similar statistics for women in a couple with no children at home, adopting the same selection criteria as in the main sample (except of course for the age of children) (Table A 3). Statistics (Table A.3, columns 10 to 13) suggest that they have worked more full-time weeks, that their is a larger proportion working full-time in Québec than in the RofC. And the same trends are observed in both regions. The women in couples with no children in Québec and RofC (Table A.3), are also very similar in terms of demographic characteristics and work behaviour over the sample time period.

The expenditure share categories over the years 1997 to 2009 are presented for families with children by region in Table A.4. Six categories (food, main shelter, household operation, clothing, transport, and leisure) represent on average 80 percent of expenditures. The food share is larger in Québec and has significantly decreased for both regions. The share for the main shelter is higher in Québec and has marginally decreased in both regions. For household operations and clothing shares, differences and trends by year and region are more marginal. For transport and leisure, we notice large increases over time in both regions. The tobacco and alcohol, and lottery game shares, although small, have consistently decreased over time in both regions. The shares for couples with no children (not shown) indicate that they are almost all the same over regions and years.

6 Results

Above we indicated that the childcare policy was implemented over 4 years before it accomodated all children less than 6 not in kindergarten (September 1997 to September 2000) and that new spaces were added only from year 1999. In the case of ineligible lower aged children, it is possible that parents were informed that low-fee caregivers would eventually provide a subsidized space when the child got older and rushed into the labour market after the birth of the child to be in a position to eventually obtain a subsidized space. The government also publicized (at the announcement of the policy in January 1997) the need to find the child a space in a subsidized daycare setting as early as possible. There was a very strong incentive

[15] The statistics are almost the same for families with youngest child aged 0 to 15 years.

to obtain a space early on to reap benefits from the policy for as many years as possible. This incentive was lower for mothers with children aged four or three in the first years of the policy as, in their case, the benefits of the new policy lasted for a much shorter time.

Furthermore, given the results in Lefebvre and Merrigan (2009) which show that the policy probably incited mothers that would not have returned in the labor market even when the child entered school in the counterfactual world of no daycare low-fee policy, to join the labour market when the child is very young and stay there for good or until she gives birth again, it is feasible that the policy could affect relative income shares in families where children are no longer of daycare age. Children aged 3 or 4 in 1998 (second year of implementation) are aged 13 or 14 years in 2009, therefore we consider in 2009 that families with children who are 13 or 14 are affected by the policy. The 0 to 4 year-old children in 2000 are aged 9 to 13 in 2009. Therefore, as our base sample we selected couples with at least one child aged 0 to 14 years with the post-reform period chosen to be 2001. We also conducted estimations for families with children aged 0-15 and 2001 as the post-reform period to examine the sensibility of results with the chosen windows, but results were very similar to the 0-14 group.

GMM estimations of equations (1) and (2) were conducted for all samples. We also performed GMM estimations using two alternative instrumental variables in lieu of post-policy period dummies interacted with a Québec dummy. The second set of instrumental variables are the post-policy yearly instruments interacted with a dummy if the youngest child in the household is eligible or had been eligible for subsidized daycare. Finally, we provide estimations with the number of regulated childcare spaces for children 0 to 5 years old and before- and after-school for kindergarten divided by the total number of children 12 or less by province for a sample of families with at least one child 0 to 12 as an instrument and for the years 1997 to 2009.[16]

We performed three series of estimations, each with the three instruments. The first one with a sample of households with children 0 to 14 years of age. In the second series of estimations we changed the age groups of children (0 to 5, 0 to 10) more directly affected by the policy. In a third series, as falsification exercises we changed the sample years and the age groups of children to estimate the model with families from Québec that were not

[16]The data set is provided by Friendly et al. (2012). The number of regulated and subsidized spaces are a policy decision since the creation of new spaces may imply public subsidies (to providers and to families depending on their income in the Rest of Canada). For Québec, the policy is a costly one. In 1996-1997, public subsidies amounted to 288 million dollars. Under the childcare reform, these subsidies were gradually abolished. Instead, the regulated and subsidized childcare providers receive a fixed amount per child per day, depending on the age and type of childcare setting, complemented with the low-fee contribution of the family. By 2011-2012, the total government subsidy reached 2.2 billion. In the first year of the policy (covering only the 4-year-olds and continuing parental fee-subsidies for the other children in daycare), the mean subsidy per space was $3,888. For fiscal year 2011-2012, the mean subsidy amounted to $10,210 per space.

exposed to the childcare policy and their counterparts in the RofC. Samples based on the age groups of children that were not eligible for the policy were selected as placebo groups: children aged 11-17 from 1997-2000 (with post-reform period 2001-2009), and children aged 9-14 in 1997-2000 (with post-reform years 2001-2004) We also estimated the impact of the policy for couples with no child present in the household. Finally, we conducted statistical tests of under or weak identification, excluded instruments, and over-identification.

The GMM policy estimates ($\beta_2 \widehat{M_Share_{it}}$coefficients in equation (2)) for the main sample (couples with children aged 0-14)[17] are presented in Table 1. Results are presented with the three alternative sets of IV's. The three sets of instruments used are: (1) post-policy dummies, (2) post-policy dummies for families with children having been affected by the policy, and (3) number of childcare spaces divided by number of children by year and province.

For the clothing categories (all types, for very young children, for women and girls, and for men and boys) coefficients in almost all specifications are not statistically significant, except in some cases for women and girls' (aged more than 4 years-old) clothes, with a significant and negative effect. One drawback of the data set is that we cannot distinguish adults' clothing expenditures from childrens'. The increases in the mother's income share may drive conflicting changes in the different clothing categories. The coefficient of the mother's share on clothes for the 0-4 year-old children suggests a positive effect but it is almost always not significant. The effect of the policy on the share of health expenditures, education and the aggregate of health and education are positive and significant. The effect is also generally positive and significant for the share of reading materials. Under the aggregated category human, we have included household operation, education and reading expenditures. Theses are associated with child well-being and allow us to assess the overall impact of mothers income shares on goods and services that are collective in nature. We find a strong positive and significant effect. This suggests increased maternal income share of total household results in the family investing more in collective goods that likely benefit children. These results corroborate previous evidence discussesd earlier.

The last two categories, tobacco and alcohol, and games of chance (government-run lotteries, casinos, bingos, non-government lotteries, less game winnings in dollars) show negative coefficients A.4). These results also support the idea that higher mothers' income shares may pressure the household to move away certain type of goods.

These shares are of interest because they may be associated to certain members of the family: mothers, fathers, and children. Although, this empirical model cannot tell which members have benefited most, as well as the collective characteristics of these expenditures, the effects suggest that mothers income' shares have played a role in intrafamily allocation.

[17] The results for the 0-15 years are vey similar and available on request.

The 5 panels of Table 2 present the same type of estimations for samples of families where the youngest children are aged between 0-5 or 0-10 years. The effects are very similar. For the estimations with post-policy age dummies (panel 1), the significant coefficients are smaller than in the preceding estimations; with significant positive coefficients for the furniture and equipment category, health, and negative effects for tobacco and alcohol, and chance games. In panel (3), we also present results when using childcare spaces as instruments the youngest are aged 0 to 5 directly affected. The effects match those in the first two panels. Panels 4 and 5 present results with the first two sets of instruments providing the the same significant coefficients. ,

In sum, the categories whose ratios have increased (household operation, health, education) or decreases such as the two "vice" categories, have appreciable direct impacts on family and children well-being, may be more than expenses on furniture and equipment and main shelter.[18]

The statistical tests on instruments and identification described in Baum et al. (2007) and Stock and Yogo (2005) are presented in Tables 5 and 6.[19] Table 5 presents the coefficients of the first two sets of excluded instruments (and childcare spaces as instrument). It is worth mentioning that the tests indicate that the coefficients on the instruments in the reduced form equation for expenditure shares are statistically significant (Angrist-Pische p-value of F test). Second, the most of the instruments are strongly significant in the first stage. As for over-identification tests (not presented), only once is the null rejected, what we expect from chance alone.

Table 6 presents tests for weak, under identification for the first stage as well as the Hansen J statistic. We strongly reject the null that the model is underidentified and do not reject the null that the instruments are uncorrelated with the second-stage error term. However, the model does suggest a problem of weak identifcation as the F statistic for the exclusion of instruments in the first stage is less than 10 and both the Craig-Donald Wald F statistic and Kleinberger Paap rk Wald statistic are rather small compared to critical values associated with small rejection rates.

7 Falsification and placebo estimations

As a falsification exercise, we re-estimated the expenditures share equations for families with children not exposed to the policy over the years considered.[20]The first panel (1) of

[18]In the case of expenditures for the main shelter, it is not clear what trend could be expected with the declining cost of residence financing in the 2000s.

[19]We use the Stata ado program, ivreg2, developped by Baum et al. (2007).

[20]We also conducted the estimations excluding year 2009 from the post-reform period since the financial shock and its impact of employment may have induced families to revise their expenditure patterns. The

Table 3 present placebo results for families with no children present in the household, with post-policy dummies as instruments. The Québec women in these families are very similar to those in the RofC with respect to their demographic characteristics. We do not find significant effects except one or two as predicted by chance. The next four columns of Table 3 present results for families respectively, with children aged 11 to 17 years observed during the post reform period (2001-2009), and with children aged 9-14 years (period 2001-2005 as post-policy), with (1) post-policy dummies and (2) post-policy age dummies as intruments. Again, very few coefficients are significant (columns 2 and 3),.the last panels (columns 4 and 5) tell the same story.

8 Conclusion

In this paper we estimate the effect of the mother's family income share on shares of expenditures in the household, for a given level of household expenditures, using public policy shocks arising from the development of universal low-fee childcare network in a large Canadian rovince, as instruments for the mother's shares. Over the years, most of Québec's mothers have reacted to the reform by increasing their labor force participation (at the extensive and intensive margins), and outpaced that of similar mothers in the RofC The policy augmented the share of mothers' income within the household (earnings and total income), because fathers' labor supply behaviour did not change compared to fathers in similar families in the RofC. This model is estimated for a sample of families in Québec and the RofC with children aged 0-14, and sub-samples of families differentiated by type and the age groups of children. The impact of the mother's shares on the ratios of expenditures for several goods are estimated using 3 sets of instrumental variables with GMM, to take into account the endogenous mothers' income shares.

The results show that for the sample of families covered by the reform, increasing mothers' share of income has a significantly influence on the structure of expenditures with more spending targeted to goods and services associated with children's well-being and development. The effects of mothers' empowerment (relative control over family resources) has been a difficult challenge for collective labor model, considering empirically the paucity and limits of traditional surveys on expenditures (for use of a special data set, see Cherchye, De Rock, and Vermeulen, 2012). This paper suggests that a universal public policy (in this case childcare) may have long lasting influence on children's well-being by increasing the bargaining position of mothers.

results without 2009 are vert similar.to those obtained with the full sample.

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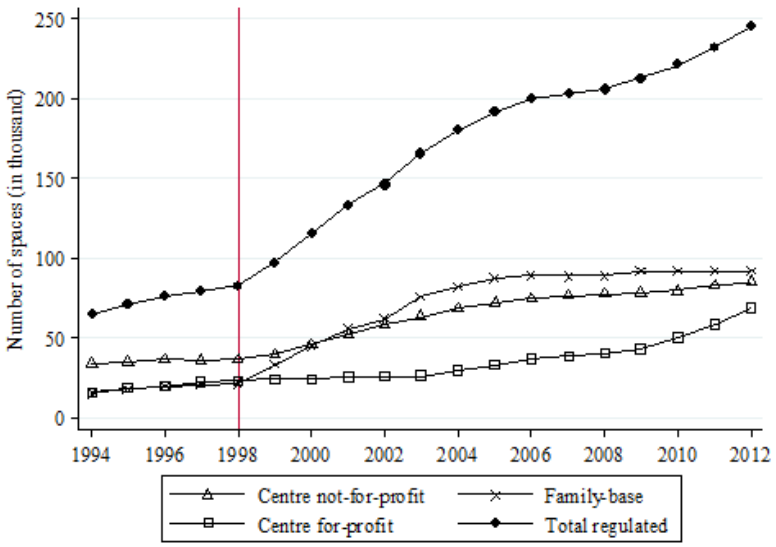
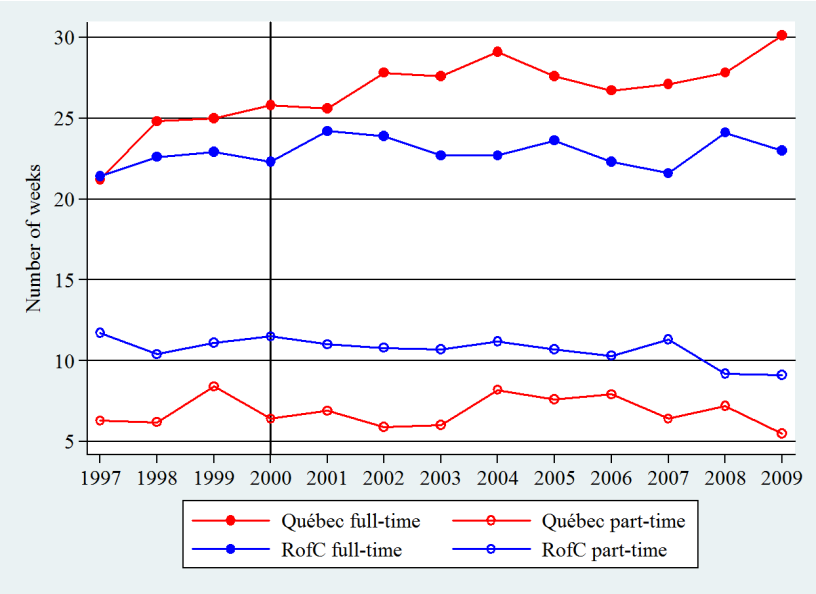
10 Figures

Figure 1: Number of regulated spaces



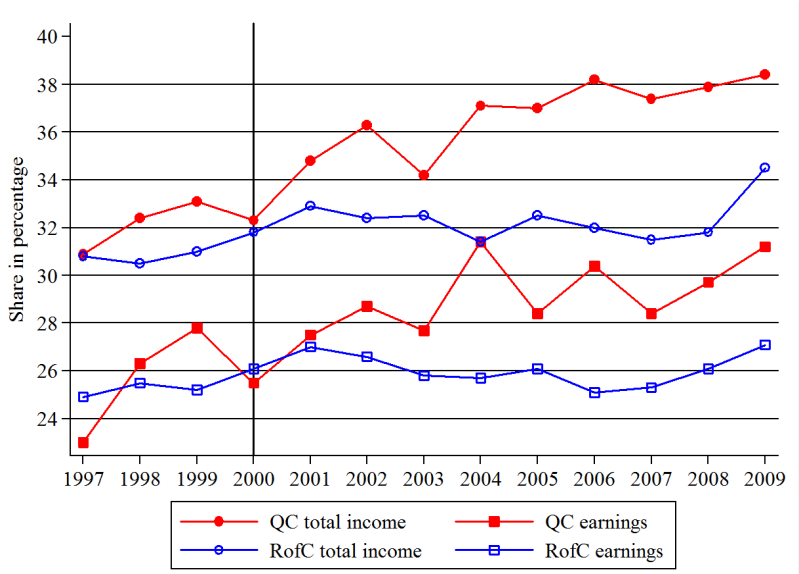
Note: Shows the evolution of the number of spaces by mode of care between 1994 and 2012. As of 2001, all spaces are in centre, not-for-profit, and family-based care. Most spaces in for-profit centre care are at the subsidized low fee. The number of spaces is measured on March 31^{st} of each year by the Direction générale des services de garde, Ministry of Families and Elders (MFA). The vertical line marks the first post-reform year. The data can be accessed at www.mfa.gouv.qc.ca/fr/services-de-garde/portrait/places/Pages/index.aspx.

Figure 2: Average number of weeks mothers worked full-time and part-time by region and year



Note: Shows the evolution of the average number of weeks worked full-time and part-time by region from 1997 to 2009. The vertical line marks the first year of full implementation of the policy.

Figure 3: Average Mother's share of total family Income by Region



Note: Displays the avearge percentage of mother's shares of family income by type and region between 1996 and 2009. The vertical line marks the first year of full implementation of the policy.

11 Tables

Table 1: Impact of Québec's mothers total household income share on selected intra-household expenditures shares

Pre reform period			1997-2000			
Post reform period	2001-2009		2001-2009		2001-2009	
Samples: youngest child	0-14 years		0-14 years		0-14 years	
IV variables	Post-policy dummies		Post-policy age dummies		Childcare spaces	
Expenditures items	Coeff. (1)	SE	Coeff. (2)	SE	Coeff. (3)	SE
Food all	-0.229***	(0.06)	-0.249***	(0.06)	-0.262***	(0.08)
Food at home	-0.267***	(0.06)	-0.253***	(0.06)	-0.246***	(0.08)
Food out of home	0.037*	(0.02)	0.006	(0.02)	-0.001	(0.03)
Main shelter	-0.043	(0.12)	0.070	(0.08)	0.181	(0.11)
Household operation	-0.032	(0.03)	0.094***	(0.03)	0.003	(0.04)
Furniture and equipment	0.037	(0.03)	0.028	(0.03)	0.036	(0.04)
Furniture	0.007	(0.02)	0.016	(0.02)	0.005	(0.03)
Clothing all	-0.027	(0.03)	-0.065**	(0.03)	-0.052	(0.05)
Clothing child 0-4 years	0.013	(0.01)	0.008	(0.01)	0.015	(0.01)
Clothing women and girls	-0.036*	(0.02)	-0.051**	(0.02)	-0.034	(0.03)
Clothing men and boys	0.006	(0.02)	-0.016	(0.02)	-0.020	(0.02)
Transport	0.255***	(0.10)	0.188***	(0.09)	0.217*	(0.12)
Health	0.102***	(0.03)	0.076***	(0.03)	0.107***	(0.04)
Education	0.103***	(0.03)	0.067***	(0.03)	0.153***	(0.05)
Health and education	0.207***	(0.05)	0.140***	(0.05)	0.260***	(0.08)
Reading	0.009**	(0.01)	0.011**	(0.01)	0.006	(0.01)
Human	0.149**	(0.05)	0.168**	(0.05)	0.162**	(0.06)
Leisure goods and services	-0.111**	(0.04)	-0.103**	(0.06)	-0.099**	(0.05)
Leisure children	-0.022	(0.02)	-0.007	(0.02)	-0.017	(0.03)
Personal care	-0.028**	(0.01)	-0.033**	(0.01)	-0.055***	(0.02)
Tobacco and alcohol	-0.161***	(0.04)	-0.147***	(0.04)	-0.239***	(0.06)
Chance games	-0.014*	(0.07)	-0.019**	(0.01)	-0.024***	(0.01)
Observations	38,648		38,648		38,648	

Note: The dependent variables are expenditure shares. All specifications control for the real total consumption, age and age squared of the mother, number of children by age group (0-4, 5-11, 12-19), size of the community (six groups from rural to 500,000 or more the omitted group), post policy indicator, linear time trend, year dummies (omitted 1997), provincial dummies (omitted Québec) SE: Standard error Coefficient significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1 Human: household operation, education, and reading.

Table 2: Impact of Québec's mothers total household income share on selected intra-household expenditures shares for children aged 0-5 and 0-10

Pre reform period	1997-2000									
Post reform period	2001-2009		2001-2009		2001-2009		2001-2009		2001-2009	
Samples: youngest child	0-5		0-5		0-5		0-10		0-10	
IV variables	Post-policy dummies		Post-policy age dummies		Childcare spaces		Post-policy dummies		Post-policy age dummies	
Expenditures items	Coeff. (1)	SE	Coeff. (2)	SE	Coeff. (3)	SE	Coeff. (4)	SE	Coeff. (5)	SE
Food all	-0.075*	(0.05)	-0.107**	(0.05)	-0.271***	(0.13)	-0.241***	(0.07)	-0.070**	(0.13)
Food at home	-0.75*	(0.05)	-0.108**	(0.05)	-0.225***	(0.06)	-0.262***	(0.07)	-0.226**	(0.11)
Food out of home	0.003	(0.02)	0.002	(0.02)	0.011	(0.11)	0.018	(0.02)	-0.024	(0.04)
Main shelter	-0.192**	(0.09)	-0.163*	(0.09)	0.292	(0.19)	0.030	(0.09)	0.315**	(0.15)
Household operation	0.023	(0.04)	0.011	(0.04)	-0.029	(0.08)	0.039	(0.04)	0.015	(0.05)
Furniture and equipment	0.058*	(0.04)	0.082**	(0.04)	0.083	(0.08)	0.061	(0.04)	0.052	(0.05)
Furniture	0.009	(0.03)	0.030	(0.03)	0.005	(0.05)	0.027	(0.03)	0.011	(0.04)
Clothing all	0.008	(0.03)	0.018	(0.03)	-0.012	(0.06)	-0.008	(0.03)	-0.024	(0.05)
Clothing child 0-4 years	-0.003	(0.01)	-0.003	(0.01)	0.025	(0.02)	0.004	(0.01)	0.019	(0.01)
Clothing women and girls	-0.019	(0.02)	-0.012	(0.02)	-0.021	(0.04)	-0.023	(0.02)	-0.015	(0.03)
Clothing men and boys	0.022	(0.01)	0.024	(0.02)	0.000	(0.03)	0.013	(0.02)	-0.012	(0.02)
Transport	0.212**	(0.09)	0.225***	(0.10)	0.238	(0.19)	0.231**	(0.10)	0.117	(0.13)
Health	0.058**	(0..03)	0.080***	(0.03)	0.152**	(0.07)	0.083**	(0.03)	0.109**	(0.03)
Education	0.045*	(0.02)	0.035	(0.03)	0.148**	(0.07)	0.084***	(0.05)	0.131**	(0.05)
Health and education	0.097**	(0.04)	0.121***	(0.04)	0.300**	(0.13)	0.174***	(0.06)	0.240***	(0.09)
Reading	0.002	(0.00)	0.003	(0.00)	0.006	(0.01)	0.006	(0.01)	0.006	(0.01)
Human	0.064	(0.04)	0.046	(0.05)	0.124	(0.09)	0.133***	(0.05)	0.153**	(0.07)
Leisure goods and services	-0.061*	(0..04)	-0.071*	(0.04)	-0.065	(0.09)	-0.091*	(0.05)	-0.057	(0.07)
Leisure children	-0.015	(0.02)	-0.019	(0.02)	-0.002	(0.04)	-0.016	(0.02)	0.000	(0.03)
Personal care	-0.012	(0,01)	-0.013	(0.01)	-0.077**	(0.04)	-0.032**	(0.02)	-0.068***	(0.03)
Tobacco and alcohol	-0.114***	(0.03)	-0.120***	(0.04)	-0.303***	(0.11)	-0.179***	(0.05)	-0.267***	(0.08)
Chance games	-0.013***	(0.01)	-0.014*	(0.01)	-0.040**	(0.02)	-0.016**	(0.02)	-0.026**	(0.01)
Observations	20,067		20,067		20,067		30,722		30,722	

Note: The dependent variables are expenditure shares. SE: Standard error Coefficient significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1 Human: Household operation, education, and reading. Controls: see Table 1.

Table 3: Estimations of Québec's mothers total family income share on selected intra-household expenditures ratios for families not eligible for low-fee childcare

Pre reform period					1997-2000					
Post reform period	2001-2009		2001-2009		2001-2009		2001-2005		2001-2005	
Samples: youngest child	Couples no child		11-17 years		11-17 years		9-14 years		9-14 years	
IV variables	Post-policy dummies		Post-policy dummies		Post-policy age dummies		Post-policy dummies		Post-policy age dummies	
Expenditures items	Coeff. (1)	SE	Coeff. (2)	SE	Coeff. (3)	SE	Coeff. (4)	SE	Coeff. (5)	SE
Food all	-0.064	(0.10)	0.010	(0.08)	-0.006	(0.23)	-0.277*	(0.15)	0.134	(0.19)
Food at home	-0.085	(0.09)	-0.111	(0.08)	-0.200	(0.24)	-0.325**	(0.15)	0.019	(0.19)
Food out of home	0.022	(0.06)	0.110**	(0.05)	0.130	(0.14)	0.049	(0.05)	0.057	(0.12)
Main shelter	0.171	(0.18)	-0.025	(0.13)	0.213	(0.37)	-0.179	(0.20)	0.092	(0.35)
Household operation	0.069	(0..59)	-0.005	(0.04)	-0.129	(0.12)	-0.033	(0.05)	-0.328	(0.29)
Furniture and equipment	-0.085	(0.09)	0.014	(0.09)	-0.110	(0.15)	0.105	(0.08)	-0.015	(0.15)
Furniture	-0.075	(0.06)	-0.016	(0.03)	-0.057	(0.14)	0.049	(0.06)	-0.021	(0.10)
Clothing all	-0.037	(0.07)	-0.031	(0.05)	-0.317	(0.27)	-0.028	(0.07)	-0.106	(0.17)
Clothing child 0-4 years	0.004	(0.01)	-0.005*	(0.00)	-0.011	(0.01)	0.001	(0.00)	0.004	(0.00)
Clothing women and girls	-0.027	(0.04)	-0.005	(0.03)	-0.199	(0.18)	-0.036	(0.05)	-0.019	(0.03)
Clothing men and boys	-0.013	(0.03)	0.006	(0.04)	-0.101	(0.10)	0.006	(0.04)	-0.016	(0.07)
Transport	0.065	(0.19)	-0.070	(0.15)	0.392	(0.51)	0.535***	(0.29)	0.174	(0.34)
Health	0.010	(0.05)	0.084**	(0.04)	0.003	(0.10)	0.040	(0.06)	-0.060	(0.12)
Education	-0.174**	(0.09)	0.042	(0.06)	0.500	(0.38)	0.043	(0.09)	-0.029	(0.11)
Health and education	-0.085	(0.09)	0.138*	(0.08)	0.524	(0.40)	0.095	(0.11)	-0.093	(0.18)
Reading	0.004	(0.01)	0.008	(0.01)	-0.018	(0.02)	-0.009	(0.01)	-0.019	(0.03)
Human	-0.100	(0.09)	0.051	(0.07)	0.457	(0.38)	-0.016	(0.10)	-0.090	(0.09)
Leisure goods and services	-0.005	(0.08)	0.014	(0.07)	-0.261	(0.30)	0.040	(0.06)	0.129	(0.18)
Leisure children	-0.004	(0.03)	-0.043	(0.03)	-0.045	(0.09)	-0.018	(0.04)	-0.097	(0.14)
Personal care	-0.018	(0.02)	0.009	(0.02)	-0.088	(0.09)	-0.016	(0.02)	-0.090	(0.09)
Tobacco and alcohol	-0.015	(0.08)	-0.073	(0.05)	-0.150	(0.14)	-0.033	(0.07)	0.010	(0.13)
Chance games	0.018	(0.02)	0.004	(0.01)	-0.036	(0.03)	-0.010	(0.01)	-0.033	(0.05)
Observations	15,919		12,930		12,930		8,582		8,582	

Note: The dependent variables are expenditure ratios. SE: Standard error Coefficient significance is denoted using asterisks: *** is p<0.01, ** is p<0.05, and * is p<0.1 Human: Household operation, education, and reading. Controls: see Table 1.

Table 4: First stage OLS estimation tests

	Post-policy dummies instruments	Excluded instruments Coefficient	Robust Standard error SE	Post-policy age dummies instruments	Excluded instruments Coefficient	Robust Standard error SE
1	2001*QC	0.005	(0.014)	2001*QC*age	0.006	(0.016)
2	2002*QC	0.028**	(0.014)	2002*QC*age	0.035**	(0.016)
3	2003*QC	0.005	(0.013)	2003*QC*age	0.001	(0.014)
4	2004*QC	0.045***	(0.014)	2004*QC*age	0.039***	(0.015)
5	2005*QC	0.034**	(0.014)	2005*QC*age	0.037**	(0.015)
6	2006*QC	0.052***	(0.015)	2006*QC*age	0.047***	(0.015)
7	2007*QC	0.049***	(0.016)	2007*QC*age	0.048***	(0.016)
8	2008*QC	0.051***	(0.018)	2008*QC*age	0.048***	(0.017)
9	2009*QC	0.030*	(0.018)	2009*QC*age	0.030*	(0.018)
Angrist-Pischke (A-P)				Angrist-Pischke		
F test (p-value)		5.01	(0.000)	F test (p-value)	4.14	(0.000)
N		38,648		N	38,648	
Childcare spaces (A-P)		19.82	(0.000)			

Table 5: 2-step GMM estimation tests for post-policy dummies instruments

Expenditures items	Under identification Kleibergen-Paap rk LM Chi-sq/p-value	Weak identification Cragg-Donald Wald F statistic/ Kleibergen-Paap rk Wald F statistic	Over identification of all instruments Hansen J statistic/ Chi-sq P-value
Food all	44.6/0.00	10.4/5.02	3.54/0.89
Food store	44.6/0.00	10.4/5.02	5.70/0.68
Food out of home	44.6/0.00	10.4/5.02	14.3/0.07
Main shelter	44.6/0.00	10.4/5.02	13.2/0.10
Household operation	44.6/0.00	10.4/5.02	14.3/0.07
Furniture and equipment	44.6/0.00	10.4/5.02	1.99/.98
Furtniture	44.6/0.00	10.4/5.02	0.95/0.99
Clothing all	44.6/0.00	10.4/5.02	19.4/0.01
Clothing children 0-4	44.6/0.00	10.4/5.02	8.83/0.36
Clothing women and girls	44.6/0.00	10.4/5.02	17.7/0.02
Clothing men and boys	44.6/0.00	10.4/5.02	7.69/0.46
Transport	44.6/0.00	10.4/5.02	0.14/0.33
Health	44.6/0.00	10.4/5.02	9.90/0.27
Education	44.6/0.00	10.4/5.02	12.4/0.13
Health and education	44.6/0.00	10.4/5.02	6.28/0.62
Reading	44.6/0.00	10.4/5.02	3.88/0.87
Human	44.6/0.00	10.4/5.02	4.80/0.78
Leisure goods-services	44.6/0.00	10.4/5.02	4.85/0.77
Leisure children	44.6/0.00	10.4/5.02	4.53/0.81
Personal care	44.6/0.00	10.4/5.02	14.4/0.07
Tobacco and alcohol	44.6/0.00	10.4/5.02	9.57/0.29
Chance games	44.6/0.00	10.4/5.02	8.10/0.42

Note: Sample for each estimation are families with children aged 0 to 14 years, post-estimation period 2001-2009 and post-policy instruments. For Cragg-Donald F statistic and i.i.d. errors, Stock-Yogo critical values are 11.46 (6.65) for 10% (20%) maximal IV relative bias

Table A. 1: Average labour force characteristics: type of household, region and year

	Couples with children aged 0-14 years								Women in couple and no child			
	Percentage working full-time 0 week/52 weeks		Mother labour force status			Father labour force status			% Full-time weeks	Female labour force status		
Years	Mother	Father	Full-time	Part-time	Not Working	Full-time	Part-time	Not Working	0/52	Full-time	Part-time	Not Working
					Québec							
1997	47/30	11/68	32	38	30	72	20	8	32/47	49	35	15
1998	43/36	8/71	37	37	25	73	22	5	29/48	50	33	18
1999	43/37	8/71	38	38	23	75	21	4	27/49	50	40	11
2000	42/38	6/72	40	34	26	77	17	5	20/59	62	25	13
2001	42/37	9/75	39	35	26	77	17	6	26/52	55	28	16
2002	36/43	8/74	44	33	22	74	21	5	28/44	45	41	13
2003	35/41	9/70	44	36	20	76	20	4	27/50	53	37	10
2004	32/44	7/74	45	40	15	78	20	2	19/47	54	40	6
2005	38/41	5/75	43	37	20	75	20	4	30/53	55	33	12
2006	37/35	7/73	38	44	19	70	26	4	25/47	54	33	13
2007	34/36	8/66	38	42	20	70	24	5	14/63	65	30	5
2008	35/40	5/72	43	40	17	77	21	2	24/53	55	37	8
2009	30/45	14/53	49	31	20	60	36	4	20/54	62	33	5
					Rest of Canada							
1997	50/31	7/74	34	45	21	77	18	4	30/50	54	32	14
1998	48/33	9/73	35	42	22	76	19	5	25/52	55	34	11
1999	47/33	8/75	35	44	21	78	17	5	25/58	61	37	12
2000	48/32	8/76	34	45	21	79	16	4	27/53	56	29	15
2001	44/36	7/76	38	43	19	78	18	4	25/56	54	30	11
2002	46/35	9/76	37	43	20	78	17	4	25/53	57	30	14
2003	47/33	8/77	35	44	21	80	16	4	25/53	57	32	11
2004	46/33	5/78	36	44	20	80	17	3	22/57	60	32	7
2005	45/36	8/77	38	42	20	80	16	4	22/59	62	28	11
2006	47/31	8/75	34	46	21	78	17	5	22/51	56	34	10
2007	47/31	7/77	33	46	21	79	17	4	22/55	59	31	10
2008	44/36	6/77	38	40	22	80	17	3	20/56	54	35	6
2009	45/33	10/69	35	43	23	73	22	6	28/52	58	33	10
Mean	42/33	8/75	35	44	21	78	18	4	24/54	58	31	11

Table A. 2: Summary statistics of families with children aged 0-14 years, by region and year

Years	N	Mother Age	Father Age	HH Size	Child 0-4	Child 5-14	Urban size large	Mother income/ family income	Mother earnings/ family earnings	Mother transfers/ family transfers	Mother other incomes/ family other incomes	Family CB and UI/ Total transfers	Family income taxes/ income	Mother education level:> high school
Québec														
1997	585	35	38	4.1	0.62	1.21	60	31.1	22.5	72	14	Na	20.6	Na
1998	482	36	38	4.1	0.54	1.28	59	32.6	25.3	74	14	Na	21.3	Na
1999	525	36	39	4.1	0.57	1.25	60	33.4	27.8	71	14	Na	22.1	Na
2000	511	36	39	4.1	0.53	1.33	57	32.4	25.5	70	12	Na	20.7	Na
2001	429	35	39	4.1	0.51	1.21	60	34.9	27.5	73	15	Na	22.3	Na
2002	385	37	39	4.1	0.53	1.29	62	36.4	28.7	74	14	Na	18.6	Na
2003	611	36	38	4.1	0.50	1.23	60	33.8	27.7	75	11	Na	21.6	Na
2004	371	37	38	4.1	0.52	1.22	60	37.1	31.4	79	12	87	21.2	48
2005	364	36	38	4.1	0.57	1.16	60	37.0	28.4	79	11	86	20.0	59
2006	317	37	39	4.1	0.61	1.18	64	38.2	30.4	80	12	91	19.8	59
2007	234	36	39	4.1	0.55	1.17	58	37.5	28.4	83	13	89	19.7	66
2008	187	37	39	4.1	0.67	1.13	64	38.1	29.7	83	11	93	20.3	62
2009	180	37	39	4.1	0.72	1.17	61	38.5	31.2	79	9	92	20.2	65
Rest of Canada														
1997	3,525	36	38	4.2	0.57	1.29	45	30.7	24.9	73	15	Na	21.0	Na
1998	2,821	36	38	4.2	0.59	1.25	46	30.6	25.5	72	15	Na	20.2	Na
1999	3,641	36	39	4.2	0.58	1.26	45	31.0	25.2	74	14	Na	20.6	Na
2000	2,901	36	39	4.2	0.55	1.26	46	31.6	26.1	70	15	Na	19.5	Na
2001	2,599	37	39	4.2	0.55	1.28	47	33.0	27.0	75	12	Na	19.6	Na
2002	2,848	37	39	4.2	0.56	1.24	48	32.3	26.6	75	13	Na	19.6	Na
2003	2,429	37	38	4.2	0.55	1.28	48	32.4	25.8	76	11	Na	19.3	Na
2004	2,412	37	38	4.2	0.56	1.26	49	31.4	25.7	79	10	85	20.0	57
2005	2,302	37	40	4.2	0.56	1.24	50	32.5	26.1	82	11	84	20.0	59
2006	2,300	37	38	4.2	0.56	1.22	48	32.1	25.1	81	13	87	20.8	59
2007	1,860	36	38	4.2	0.50	1.30	53	31.5	25.3	85	13	89	20.1	63
2008	1,514	36	38	4.2	0.60	1.27	51	31.8	26.1	78	11	88	19.6	69
2009	1,451	38	38	4.2	0.64	1.23	51	34.5	27.1	77	12	91	18.4	64
Mean	[32,591]	37	38	4.2	0.57	1.26	49	32.0	25.9	76	13	87	20.0	62

1. Earnings: total paid employement and total self-employment income. 2. Other incomes: transfers, investment income, and other miscellaneous income. 3. total income includes miscellaneous income from other sources. 4. CB: child benefits; UI: unemployment insurance.

Table A. 3: Summary statistics of couples with no child, by region and year

Years	N	Woman Age	Spouse Age	Urban size	Women income/ family income/	Women earnings/ family earnings	Women transfers/ family transfers	Women other incomes/ family other incomes	Household transfers/ Total income	Family UI/ Total transfers	Family income taxes/ income	Women education level:> high school
						Québec						
1997	222	34	38	63	35	32	41	16	7	Na	23	Na
1998	165	35	38	63	38	33	49	16	8	Na	23	Na
1999	191	36	38	56	38	35	42	12	7	Na	22	Na
2000	164	35	39	66	42	36	46	11	6	Na	26	Na
2001	180	36	39	63	40	34	47	12	10	Na	21	Na
2002	174	36	39	63	37	34	45	11	7	Na	21	Na
2003	313	35	38	64	39	35	53	16	6	Na	21	Na
2004	175	36	38	62	43	38	43	13	6	42	21	60
2005	180	36	38	62	39	35	47	11	8	31	19	64
2006	152	36	39	62	41	35	54	17	8	32	18	60
2007	119	36	39	67	42	40	40	10	5	37	21	61
2008	98	36	39	57	39	35	48	20	5	34	19	56
2009	95	36	39	58	44	41	42	11	6	53	19	56
						Rest of Canada						
1997	1,236	36	38	56	37	34	43	16	6	Na	21	Na
1998	1,052	36	38	56	37	32	43	11	6	Na	21	Na
1999	1,244	36	39	47	38	35	47	12	5	Na	21	Na
2000	1,082	36	39	42	39	35	45	14	6	Na	20	Na
2001	1,238	36	39	43	38	34	48	12	6	Na	21	Na
2002	1,060	36	39	46	37	34	51	12	4	Na	21	Na
2003	1,118	36	38	46	39	34	46	10	5	Na	20	Na
2004	1,060	36	38	45	39	37	40	8	4	35	20	61
2005	1,027	37	40	50	40	36	53	13	3	39	20	62
2006	1,104	36	38	48	41	36	49	14	5	41	21	61
2007	921	35	38	55	39	35	47	14	3	38	20	64
2008	698	35	38	47	39	35	48	13	3	44	21	66
2009	766	35	38	46	41	37	44	11	4	45	19	69
Mean	(13,606)	36	38	49	39	35	46	12	5	40	20	65

Table A. 4: Mean Expenditure shares of families with children aged 0-14 by region and year

Expenditure items	Québec						Rest of Canada						
Year	1997	2001	2006	2008	2009	Mean	1997	2001	2006	2007	2008	2009	Mean
Food all	0.21	0.20	0.18	0.18	0.16	0.19	0.17	0.16	0.15	0.15	0.15	0.14	0.16
Food at home	0.18	0.17	0.14	0.15	0.14	0.16	0.14	0.13	0.12	0.12	0.12	0.12	0.13
Food out of home	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
Main shelter	0.26	0.24	0.23	0.25	0.25	0.26	0.29	0.28	0.28	0.29	0.28	0.28	0.28
Household operation	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.08	0.08	0.08
Furniture and equipment	0.03	0.03	0.05	0.04	0.04	0.04	0.03	0.04	0.05	0.04	0.05	0.04	0.04
Furniture	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Clothing all	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.07	0.07	0.07	0.07	0.06
Clothing child 0-4 years	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00
Clothing women and girls	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03
Clothing men and boys	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.02
Transport	0.14	0.16	0.17	0.16	0.19	0.16	0.16	0.17	0.16	0.17	0.17	0.18	0.17
Health	0.04	0.05	0.06	0.07	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Personal care	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02
Leisure goods and services	0.05	0.06	0.09	0.10	0.11	0.07	0.05	0.07	0.10	0.10	0.12	0.11	0.08
Leisure children	0.01	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02
Education	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Health & education	0.04	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.05	0.05	0.05
Reading	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Human	0.10	0.09	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.11	0.10
Tobacco & alcohol & games	0.05	0.04	0.03	0.02	0.02	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.03

Does Childcare Policy Affect Expenditures within the Family ? Evidence from a Canadian natural experiment

Catherine Haeck, Laëtitia Lebihan, Pierre Lefebvre and Philip Merrigan *

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Abstract

To increase mothers' participation in the labor market and enhance child development and equality of opportunity for children, the Canadian province of Quebec developed from 1997 a large scale low-fee childcare network for children under five. Previous studies have shown that this policy significantly increased mother's participation in the labor market and the proportion of children attending subsidized childcare. Using annual data drawn from Statistics Canada's Survey of Households Spending and a difference-in-differences approach, this paper investigates how household expenditures have been affected by the program. The results demonstrate that work-related expenditures increased and childcare expenditures decreased, a result consistent with the program's large labor supply effects and its childcare subsidies. Expenditures related to children, family goods and services having a collective aspect, such as health and education, increased, while tobacco expenses decreased. Low-income households reacted more strongly to the policy, suggesting that the gap between low- and high-income families in terms of consumption decreased after the policy was implemented. Although the effects are persistent until the child is between 6-12 years, the magnitude of the effects strongly decreased.

Keys words : Childcare policy, intrahousehold expenditures, natural experiment

JEL Classification : J13, D12, I32

*Université du Québec à Montréal. The analysis is based on Statistics Canada's restricted-access Micro Data Files and are available at the Quebec Interuniversity Centre for Social Statistics (QICSS). This research was funded by the Fonds Québécois de la Recherche sur la Société et la Culture. All computations on these microdata were prepared by the authors who assume the responsibility for the use and interpretation of these data.

1 Introduction

To improve the lives and the chances of children from low-income families and lift them out of poverty, policymakers in many countries have implemented cash benefits and work support programs (tax credits, childcare subsidies, parental leave, etc). Recent evidence suggests these programs lead to improved outcomes for children and families in terms of cognitive skills and mental and physical health measures (Milligan and Stabile, 2011 ; Dahl and Lochner, 2012 ; Evans et al., 2014).

Expenditures are an important indicator of families' material well-being and have created growing interest from researchers (Kaushal et al., 2007). Indeed, several studies argue that expenditures provide a more accurate measure of poverty than does income (Meyer and Sullivan, 2003, 2004, 2011). So, the use of consumption to assess the evaluation of social policies on well-being is being increasingly valued by the scientific community and is leading to more related research. Several studies show that the patterns of expenditures changed for Earned Income Tax Credit (EITC) eligible households compared to non-EITC eligible. They found increases in non-durables, such as children's clothing, transportation, fresh food, and also durables like vehicles purchases (Barrow and McGanahan, 2000 ; Goodman-Bacon and McGranahan, 2008 ; McGranahan and Schanzenbach, 2013). An increase in work-related expenditures among EITC-recipient households was also observed (Patel, 2011). Gregg, Waldfogel and Washbrook (2006) studied the effect of the UK government's welfare reforms in 1998-2000 on the material well-being of children in low-income families. These reforms included several programs and incentives that encouraged greater participation of women in the labor market and to reduce child poverty, such as Working Families Tax Credits, childcare subsidies, maternity and family leave and a national minimum wage. The authors showed that low-income families with children catch up to more affluent families in their expenditures and their possession of durable goods. Moreover, expenditures on child-related items (footwear and clothing, books, fruit and vegetables) were increasing faster than expenditures on other items, while the spending on alcohol and tobacco decreased. Additional research in Canada, Germany and The Netherlands shows that child benefits increased the expenditures related to children, family goods and services having a collective aspect, such as for food, child clothing, health, education, and computer expenditures. Some families also reduced spending on alcohol and tobacco items (Kooreman, 2000 ; Jones et al., 2015 ; Raschke, 2015). Finally, Kaushal, Gao and Waldfogel (2007) reported that welfare reform, in the United States in the 1990s [1], had no effect on total expenditures for low-educated single mothers ; however, the patterns of expenditures changed. Thus, reform policy is associated with an increase in expenditures on transportation and food away from home, as well as on adult clothing and footwear. They also showed that welfare reform had no impact on children's clothing and footwear or learning and enrichment.

Early Childhood Education and Care (ECEC) is an important policy tool to address child poverty because it provides benefits both to the children through quality programs and their

1. The U.S welfare policy "decreased cash benefits and discouraged welfare dependance for low-income single mothers by eliminating the entitlement to cash assistance, by creating mandatory work requirements, and by imposing time limits on welfare receipt. The changes were accompanied by expansions in such work support programs for low-income families as federal and state Earned Income Tax Credits, child-care subsidies, child tax credits, Medicaid, and child health insurance programs" (Kaushal et al., 2007).

parents by allowing them to continue participating in the labor force (Blau, 2003 ; OECD, 2006 ; Magnuson, 2013). Protecting children against poverty enhances cognitive development and health, not only during childhood, but also in adulthood (Haeck et al., 2015). A 2006 report by the OECD shows that countries with universal access to ECEC for children below the mandatory school age tend to have lower rates of child poverty. While most European countries do invest heavily in ECEC, countries like Canada ranks last in terms of public investment and access in ECEC services (OECD, 2006 ; Friendly and Prentice, 2009). However, research on ECEC has tended to focus on the labor supply effects of the program, child development and childcare participation (see Haeck et al. (2015) and Cascio et al. (2015) for a review). Relatively little is known about how ECEC affects the expenditures of households.

This study contributes to the growing research on the determinants of child poverty by investigating how household expenditures have been affected by a drastic change in the childcare subsidy policy in the Canadian province of Quebec. In 1997, the Quebec government started gradual implementation of a low-fee childcare policy. Childcare spaces were provided at a single low-fee of $5 per child per day ($7 as of 2004). The reform was phased in by age group, starting with 4-year-olds in 1997 and ending with 0–1-year-olds in 2000. Although the Quebec government intended to provide regulated and subsidized childcare spaces for all children not yet eligible for publicly provided kindergarten, the number of spaces in the year 2000 still remained constrained. Over time, that constraint was eventually lifted and, by 2006, the number of spaces in the network became stable (Haeck et al., 2015). This policy had the effect of moving a large proportion of children from informal care and maternal care to regulated childcare. Indeed, the number of regulated childcare spaces in Quebec increased from 78,864 in September of 1997 to 258,366 as of March, 2013 (Ministre de la Famille et des Ainés, 2013). More importantly, as a result of the policy, the labor force participation of mothers increased by 14.5% percent in Quebec by 2003 (Baker et al., 2008). No policy of this magnitude affecting mothers of preschool children was enacted in the other Canadian provinces between 1998 and 2009 (Haeck et al., 2015).

There are several mechanisms that can explain why childcare policy can have effects on family expenditures. First, the labor supply and earning of mothers with pre-school children have both substantially increased in Quebec after the reform (Lefebvre and Merrigan, 2008). This could be affect work-related expenses and also expenditures related to children, family goods and services having a collective aspect. Numerous empirical studies in both the developed and the developing countries [2] show that each spouse has a different impact on household decision- making and there exists a strong positive association between child well-being and the mother's relative control over family resources (Lundberg et al., 1997). Secondly, for mothers who were already working before the reform and, therefore, used child care, lower childcare costs could reorient the family budget toward other consumption items. Finally,

2. Of the most cited studies, Lundberg, Pollak and Wales (1997) and, Ward-Batts (2008) exploit the change in the UK child support system that resulted in benefits being paid to the mother instead of the father. They show that this policy led to significant increases in the share of expenditures for children's clothing and women's clothing over expenditures for men's clothing and decreases for male tobacco products (pipes and cigars). In the developing countries, Thomas (1990), Schultz (1990), Hoddinott and Haddad (1995) for example, presented empirical evidence that income and the female's share of non-labor income within a couple (women's share of cash income, or wealth at marriage) can have a significant impact on children's health, fertility or food shares, as well as alcohol and cigarette consumption.

when a child is in child care, parents can be encouraged to invest more in child or family items by wanting to mimick what happens in childcare ("spillover effect") or addressing the lack of time and attention given to the child. To our knowledge, this is the first study that addresses the effects of childcare policy on family expenditures.

We use annual data (1997-2009) drawn from Statistics Canada's Survey of Household Spending (SHS). We use a double differences approach (DD) wherein we compare Quebec households (where the youngest child is age 0 to 5) before and after the reform to comparable households in the Rest of Canada (RofC). To validate the robustness of these estimates, we estimate a triple-differences model adding a non-treated group (Quebec non-parents and parents with children age 15-21). We also allow our estimated effects to vary by groups of years to reflect the progressive increase in the number of low-fee spaces. We provide evidence by family income to determine whether the reform enhanced the equality of opportunities. Finally, we examine whether the policy had long-term effects on households who benefited from the program when their child was less than 6 years because Lefebvre et al. (2009) had demonstrated that the reform has policy substantial life-cycle labor supply effects for mothers.

We find that patterns of household expenditure changed after the reform. Work-related expenses (transportation, gasoline, household appliances and food from restaurants) increased, and childcare expenses decreased, a result consistent with the program's large labor supply effects and childcare subsidies. Expenditures related to children, family goods and services that have a collective aspect, such as health and education, increased, while tobacco expenses decreased because of the policy. We also find that low-income households reacted more strongly to the policy, suggesting that the gap between low- and high-income families in terms of consumption decreased after the policy was implemented. Although the effects remain persistent until a child is between 6-12 years, the magnitude of the effects fell sharply.

The paper is structured as follows. Section 2 describes Quebec's family policy. The data set used is presented in Section 3. Section 4 lays out the estimation strategy. Empirical results are presented in Section 5, and Section 6 concludes the paper.

2 Quebec's childcare policy [3]

In the late 1990s, the government of Quebec initiated the gradual implementation of a low-fee childcare network for children under 5 years old. The low-fee childcare spaces had a single price : $5 per day per child. On September 1, 1997, only children aged 4 on September 30^{th} were eligible for these low-fee spaces. On September 1^{st} 1998 and on September 1^{st} 1999 respectively, the 3-year-olds and 2-year-olds (on September 30^{th}) became eligible for low-fee spaces. On September 1^{st} 2000, all children aged less than 5 years of age (if not age eligible for kindergarten) became eligible for subsidized childcare. While all children were eligible, the number of available spaces at the time still did not meet the demand for spaces. Between 2000 and 2012, the number of low-fee spaces increased from 85,000 to 217,000 and thereby released the capacity constraint. In 2004, the price of low-fee childcare increased from $5 to $7 per day per child. Overall the total number of regulated spaces in Quebec more

3. For a more precise description of the reform, see Baker et al. (2008), Lefebvre and Merrigan (2008) and Haeck et al. (2015).

than tripled between 1996 and 2013 from 78,864 to 258,366 regulated spaces, and the total government subsidy reached 2.3 billion dollars for fiscal year 2012-2013 (Conseil du Trésor -Quebec, Budget 2012-2013). In contrast, the number of subsidized childcare spaces in the other Canadian provinces was relatively small compared with the province of Quebec and changed little between 1997 and 2009 (Haeck et al., 2015). This reform drastically changed maternal labour force participation and the way in which preschool children were cared for in Quebec, while no comparable changes were observed elsewhere in Canada.

The policy pursued two major objectives : to increase mothers' participation in the labor market and to enhance child development and equality of opportunity for children. Studies on the Quebec childcare reform show that it did have a significant positive impact on the labor supply of mothers of eligible children in Quebec. Lefebvre and Merrigan (2008) used annual data from 1993 to 2002, drawn from Statistics Canada's Survey of Labor and Income Dynamics (SLID) and a sample of Canadian mothers with at least one child age 1 to 5 to estimate a substantial effect of the policy on a diversity of labor supply indicators. The effects on participation, earnings, annual hours, and weeks worked due to the childcare policy were respectively, 7.3 percentage points, $2,300 (2001 dollars), 133 annual hours at work, and 4.28 annual weeks of work. Baker et al. (2008) using the first two waves (1994–1995 and 1996–1997) and the last two waves (2000–2001 and 2002–2003) of the National Longitudinal Survey of Children and Youth (NLSCY) available at the time, analyzed the impact of the childcare policy on formal childcare use and maternal work in two-parent families. Restricting their attention to preschool children age 0–4 years, they showed that the policy had substantial positive effects on mother employment and nonparental childcare use. Lefebvre, Merrigan, and Verstraete (2009), using annual data from the SLID (1996 to 2004), evaluated the potential long-term labor supply effects of Quebec's universal childcare policy. They found that the program had substantial dynamic labor supply effects on mothers in Quebec, especially for mothers who had a high probability of using low-fee daycare from their child's birth to the fifth birthday. Their results suggest that the effects were persistent over the life of a child. Kottelenberg et Lehrer (2013), adding waves of the NLSCY, confirmed the positive effects of the family policy on mother's employment and nonparental childcare use. Finally, Haeck et al. (2015), using data from the NLSCY, showed that the policy had no effect on the labor supply of the fathers.

Along with low-fee childcare, the reform implemented changes for school-age children. First, full-day kindergarten replaced half-day kindergarten for 5 year olds on September 30^{th} in school as of September 1998 [4] . Haeck et al. (2015) show that the kindergarten policy by itself did not have any impact on the labor force participation of mothers, but the combination of the low-fee daycare program and full-day kindergarten did. Second, before- and after-school daycare were now also offered to children at ages 5-12 on the school premises – also at the low-fee of $5 per day per child and $7 as of 2004. But, past research referred to above, clearly demonstrated that the main impacts on children and mothers come from the daycare policy.

4. Kindergarten is not compulsory, but if a child is enrolled in a public school, he or she must attend class for the full school day and school week. All provinces offer publicly provided free kindergarten for 5-year-olds in a school setting under the auspices of the Ministry of Education. New-Brunswick, Nova-Scotia, and Quebec (since the fall of 1997), offer full-time kindergarten, while in other provinces, kindergarten is offered half-day (2 hours and 30 minutes) during the period of our study.

3 Data

Our data are extracted from Statistics Canada's Survey of Household Spending (SHS) for the years 1997 to 2009. The SHS is a yearly survey with a cross-sectional design that collects detailed information on household annual expenditures [5]. Annual samples of approximately 15,000 households (except for the 2008 and 2009 surveys, which sampled approximately 10,000 households) also provide information on the annual income of household members (extracted from individual tax returns in a majority of cases), some demographic characteristics of the household, dwellings (e.g., type, age, and tenure) and household equipment (e.g., car, appliances, electronics, and communication equipment). Collection of the data takes place in January, February, and March, while income and spending figures are obtained for the period January 1 to December 31 of the previous year [6]. Because the SHS is principally designed to provide detailed information on non-food expenditures, only an overall estimate of food expenditures is recorded in the survey as well as expenses for food purchased from stores and food consumed outside the home, that are recorded separately. The SHS has better quality than the Consumer Expenditures Survey in United States in terms of accuracy, coverage rates, and sample size (Brzozowski and Crossley, 2011 ; Barrett et al., 2014 ; Carroll et al., 2014).

Given the policy phase-in, families were treated differently by the policy over the years. We depict this cohort eligibility pattern by presenting the eligibility of families using the age of the youngest child and the SHS year they were sampled in Table 1. The gray shaded area highlights the post-reform years, while the unshaded area refers to the pre-reform years. The numbers indicate the number of years of eligibility for subsidized childcare. Index 1 refers to the fact that these families were eligible for only a few months, not a full year. Children born in 1993 (age 4 in 1997) and in 1994 (age 3 in 1997) were eligible for low-fee childcare for only a few months at the end of 1997 and 1998, respectively. With the restricted number of subsidized places that were available and the fact that children were eligible for only 3-4 months maximum, it is clear that these families were not treated. Indeed, in the early years of the program, available spaces were already being converted to $5 day spaces but no new spaces were created. As such, it is unlikely that the policy impacted family labor force behavior or expenditures at the beginning of its implementation (Haeck et al. 2015 for evidence). However, children born in 1995 (aged 2 years in 1997) and in 1996 (aged 1 year in 1997), were eligible for two years maximum, but with a restricted number of subsidized places

5. The target population is the population of Canada's 10 provinces, excluding residents of institutions (e.g. prisons, hospitals), members of the Canadian Forces living in military camps, and people living on Indian reserves. In all, these exclusions make up about 2% of the population of the 10 provinces. Conducted since 1997, the Survey of Household Spending integrates most of the content found in the Family Expenditure Survey (FAMEX) and the Household Facilities and Equipment Survey. The preceding survey, FAMEX, was conducted every four years ; the last having been conducted in 2006.

6. Definitions of the majority of variables used in this study remained unchanged for the years 1997-2009. The SHS underwent a major redesign in 2010. One objective of that redesign was to better adapt the collection methods and the reference periods to the capacity of the respondents to provide accurate information. Thus, the 2010 and later surveys used a different collection methodology from that used for the previous surveys. The new methodology combines a questionnaire with recall periods based on the type of expenditure (1, 3, or 12 months, last payment at 4 weeks) and a daily expenditure diary that the household completes for two weeks following the interview. Data collection is now continuous throughout the year and has thus created a break in the data series. Carefully, we focused our study on the 1997-2009 years.

(framed in black). We exclude these children from our analysis, although our results remain similar whether we consider them treated or not. The addition of new low-fee spaces really took off in mid-1999, and large yearly increases persisted until 2006. Thereafter, new spaces were added at a much lower rate. Since the SHS reports yearly expenditures, our pre-reform period ended in 2000.

For the purpose of this study, our main sample is restricted to households where both spouses are present and the female spouse [7] age 21 to 50 since they were the most likely to be affected by the policy change. For fathers, the age restrictions are 21 to 60. We additionally exclude families with total pre-tax income in the top 1 percent, or above about $250,000. For reasons outlined earlier, children born in 1995 and 1996 are excluded from the analysis.

The SHS groups expenditures for individual items into a large number of categories which are then further aggregated into 14 broad groups of goods and services : expenses incurred during the survey year for food (in stores, and in restaurants or take-out settings), shelter, household operations, household furnishings and equipment, clothing, transportation, health care, education, personal care, recreation and leisure goods and services, reading materials, tobacco products and alcoholic beverages, games of chance, and a miscellaneous group of items. The sum of these 14 categories is considered as total current consumption (that is excluding personal taxes, personal insurance payments and pension contributions, and gifts of money and contributions to persons outside of the household).

For some of these categories, we changed some the items included. We deleted from some categories those items that could be considered as durables, infrequent or very selected expenditures. So, we kept shelter expenditures for the principal residence (usual expenditures including public services, but excluding expenses for traveler accommodations and vacation homes). For transportation, we used direct expenditures for private and public transportation (excluding purchases or sales of vehicles). For the leisure category, we also excluded purchases or sales or operation of durables, such as recreational vehicles. We also retained a few more narrow groups of expenditures. The large clothing category can be examined for three groups by specific gender and age of household members, namely, total clothing expenses for children less than 4, for women and girls age 4 or more, for men and boys age 4 or more. We deflated total current consumption and the 14 expenditure categories by the province specific price indexes ($2001) constructed by Statistics Canada. The list of expenditure categories that we considere are displayed in Table 2. We also report on the summary statistics for households with children 0-5 years in Quebec and the RofC pre- and post-reform and for non-parents and parents with children age 15-21.

Like many other household traditional expenditure surveys, the SHS does not contain

7. Throughout, the term "spouse" refers to cohabitees as well as married partners. We focus on two-parent families to avoid interference with other policies that are targeting low-income families (largely represented by single-parent families). Various provincial and federal reforms have been implemented since 1997 and could have interacted with the low-fee childcare reform. Baker et al. (2005) and Milligan and Stabile (2007) show that changes in family/child benefits have a statistically significant impact and a relatively large impact on different outcomes for single-parent families, but little impact on two-parent families. In addition, the Government of Quebec introduced a new work incentive policy in 2005. This work premium seeks to support and develop the work effort of low-wage workers, but also to encourage people to exit welfare and move into work (Quebec's Ministry of Finance of Quebec, 2004). Therefore, since any specific policy shock in Quebec that coincides with the universal childcare reform may have bias our results, we focus on two-parent families (Baker et al., 2008 ; Kottelenberg et al., 2013).

information on the specific expenditures made by different members of a household (except clothing by sex). There is no information available on wage rates, hours of work, and no assignable commodities for members of a household, and only spouse income and household expenditures (some with a private component and others with collective characteristics) are available. Also, the SHS has limited information on household sources of income and labor market activities.

A number of control variables are available when using the SHS. We use : spouses' age and age squared, the number of children by age group (0-4, 5-14, 15-19) and the population area size where the household resides (seven categories) [8].

4 Methodology

Our primary econometric approach is based on a DD approach now well established for evaluating natural experiments (Blundell and Costa Dias, 2009). The age of the respondent's youngest child living in the household and the respondent's province jointly determined that family's exposure to the program. So, the treatment group includes Quebec families with children age 0-5 before and after the reform, and the control group families in the RofC with children the same age for the same time period. We use data from 1997-2009 of the SHS and excluded children born in 1995-1996. The DD model is as follows :

$$Y_{it} = \alpha + \beta_1 Quebec_{it} + \beta_2 Post_{it} + \beta_3 Quebec_{it} \times Post_{it} + \phi X_{it} + \tau_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is the outcome variable for family i in year t, $Quebec$ is an indicator that takes the value of 1 if the family lives in Quebec and $Post$ is a variable that takes the value 1 if the year of survey is after 2000. The variable $Quebec_{it} \times Post_{it}$ is an interaction term, indicating the effect of treatment. The term X_{it} is a vector of socioeconomic control variables and allows us to control for socioeconomic changes in group composition. A time trend τ_t is added to the specification and ε_{it} is an i.i.d error term.

To test the sensitivity of the results, we also use a triple-differences approach. We compare the outcomes of families of young children in Quebec (treated group) and in the RofC (control group), before and after the policy change, to non-parents and parents of older children (non-treated group). One advantage of the SHS is that we know the age of the family's youngest child living in the household. Hence, we can verify that families who do not benefit from the childcare subsidies are not influenced by it. This advantage allows us to use not only a control group (the RofC) but also a non-treated group (Quebec non-parents and parents with children age 15-21) [9], thus strengthening a simple difference-in-differences set-up by adding a third difference. The difference in difference in differences (DDD) model is :

8. The age and sex of each child, the highest level of education attained by each spouse as well as whether a spouse had a disability are only available from 2004 onward.

9. For the post-reform period of 2001-2009, households whose the youngest child is between 6 and 12 years can't be considered as untreated because they are treated in the past, and thus long lasting effects of the reform on household spending could be observed. For children age 13-14 years, we excluded them from our analysis because of the progressive implementation of the reform. The only option that remains is to use those households whose youngest child is at least 15.

$$Y_{it} = \alpha + \beta_1 Quebec_{it} + \beta_2 Post_{it} + \beta_3 Quebec_{it} \times Post_{it} + \beta_4 Child05_{it} + \beta_5 Quebec_{it} \times Child05_{it} + \beta_6 Post_{it} \times Child05_{it} + \beta_7 Quebec_{it} \times Post_{it} \times Child05_{it} + \phi X_{it} + \tau_t + \epsilon_{it} \quad (2)$$

In this model, we add the variable $Child05_{it}$ which takes the value of 1, if the youngest child is between 0 and 5 in the household. The reference group is those parents whose youngest child is 15-21 and non-parents. The coefficient of interest is thus β_7 .

All regressions are weighted using Statistics Canada's sampling weights, and standard errors are clustered by province.

Several robustness checks and subgroups analysis are performed on the two methods. Indeed, since the policy of subsidized childcare was gradual, we evaluate the effects of the reform by group of years (2001-2003, 2004-2007, and 2008-2009). We additionally investigate the effects of the reform for families with total pre-tax income in the $25th$ percentile (low-income families) or not (high-income families) [10]. Finally, we analyze the persistence of the effects of the policy on household spending with children eligible for subsidized child care when they were less than 6 . So, we follow treated families for more than 12 years by investigating the households where the youngest child is between 0-12 years and 6-12 years. The variable *Post* of Equation 1 is modified to account for the progressive implementation of the policy by age of child (see Table 1).

A crucial assumption for our triple-differences framework to deliver causal effects is that of a common trend : that outcomes evolved similarly in control and treatment groups up to the policy change. Figure 1 shows the evolution of a few outcome variables (child care outside the home ; gasoline ; human [11] and total consumption) pre- and post-treatment, after accounting for a set of observables listed in Section 3. We present four trends according to the exposure to policy (Quebec vs. RofC and parents of children age 0-5 vs. non-parents of children age 0-5). We observe that the trends between the parents of children 0-5 are very similar until 2000, after which they start to diverge. Childcare expenditures decrease in Quebec while those in Canada continue to increase. For total current consumption, gasoline and human expenses, the gap between the two regions decreases, even as household spending in Quebec devoted to these items exceed those of the RofC during the post-reform period. Our regression analysis does, however, also take into account the underlying trends for non-parents of targeted children, which can alter the effects.

5 Econometric results

In this section, we investigate the effects of Quebec's childcare policy on expenditures within the family. Later we present robustness checks, subgroup analyses, and the persistence of policy effects when the child becomes older.

However, before undertaking our analysis on household expenditures, we start by providing evidence on the effects of the program on parental labor supply and incomes (see Table 3). There is a rise in the employment of mothers in Quebec, relative to the Rofc, of 6 percentage points. For fathers, the effect is significant but very low (0.6 percentage points).

10. We don't have any information on the education level of members of households before 2004.
11. Under the aggregated category of human, we included health, education and reading expenditures.

The policy has a significant effect on the number of weeks worked full-time and part-time [12] for mothers, but not for fathers. For annual total income and earnings, the effects are, respectively, $3,291 and $2,558 for mothers. In contrast, the reform has no effect on fathers' total income and earnings. Although measurement errors can be large and the SHS is not very well suited to investigate labor-related issues, we are able to replicate the findings of Lefebvre and Merrigan (2008), Baker et al.(2008) and Haeck et al. (2015). Thus, the policy has a significant effect on maternal labor supply and hence on total income and earnings. However, the effect on fathers' labor outcomes is null, thus confirming the fact that women do show a lower attachment to the labor force than men and a higher elasticity of labor supply. For the rest of the study, we focus only on household expenditures.

5.1 Estimated effects for the full sample

Table 4 presents the estimated effects of the subsidized childcare policy on household expenditures where the youngest child is between 0 and 5 years.

We first present the results for the DD method. The policy has no impact on food and household operation expenditures. However, child care expenditures decreases significantly ($258), which is consistent with the implementation of childcare subsidies lowering the net cost of spaces. We also observe a positive effect on household appliances spending and no effect on shelter spending. The expenditures for transport ($393), gasoline ($167) and public transport ($47) increase significantly after the reform, simply because more Quebec mothers must travel to work and take their younger children to childcare facilities. The effect of the policy on health ($361), education ($122) and reading material expenditures ($18) are positive and significant. Under the aggregated category of human, we included health, education, and reading expenditures and we find a strong positive and significant effect ($501). This result suggests that the policy, by increasing mothers' participation in the labor market (and thus the family's income) as well as the proportion of children in regulated childcare, allowed the family to invest more in collective goods that likely did benefit the children. These results corroborate the previous evidence discussed here. The policy has no impact on leisure and computer expenditures. For the clothing categories (all types, for very young children, women and girls, and men and boys) coefficients are generally not statistically significant, except for expenses of children age less than 4 years, where the effect is negative, but small ($19). One drawback of the data set is that we can't distinguish adults' clothing expenditures from that for children. The policy may drive conflicting changes in the different clothing categories. We find large and significant decreases in tobacco spending ($151), but no effect, however, on alcohol, games, and personal care expenditures. Finally, we find positive, but insignificant, effects on total household consumption.

The estimates we report are intention-to-treat effect (ITT) and do not reflect the effects on households directly affected by the reform. Thus, we calculate the effect of the treatment on the treated (ATT) by dividing the policy coefficient (ITT) by the probability of being treated. Following Baker et al (2008) and Kottelenberg et Lehrer (2013), we define the treatment as

12. Full-time if weeks worked full-time plus part-time weeks$\geq$ 49 and full-time weeks $\geq$25; part-time if weeks worked full-time plus part-time weeks = 1 to 48 weeks worked full-time weeks plus part-time weeks $\geq$49 and full-time weeks$<$ 25; did not work if full-time weeks plus part-time weeks = 0. Maximum value of weeks worked is 52.

the increase in childcare use and/or the increase in maternal labor supply. The estimates of these effects using the recent NLSCY data are 0.19 and 0.11, respectively (Kottelenberg and Lehrer, 2013). We find that the ATT were quite large. For example, the estimates suggest that eligibility for subsidized childcare increased by $393 for transportation spending, that is, a 8.3 percent rise relative to the prepolicy mean, for an effect on the treated between $2,006 and $3,574, which is between 63 percent and 112 percent of a standard deviation. The gasoline expenditures have similar magnitudes when scaled for treatment (between $850 and $1,515, which is between 68 percent and 121 percent of a standard deviation). The results for education expenditures imply a 27 percent rise relative to the mean score of $449 for the intention-to-treat effects, which is 12.4 percent of a standard deviation. When scaled for treatment, the effect is between $625 and $1,113, which is between 64 percent and 113 percent of a standard deviation. The effects are as large for other expenditures categories. For example, for tobacco, the estimates suggest that eligibility for subsidized childcare decreased by $151 for these expenditures, that is a 19.2 percent decline relative to the mean, for an effect on the treated between $770 and $1,372, which is between 63 percent and 111 percent of a standard deviation.

To test the sensitivity of the results, we also estimate a triple-differences model where we added a non-treated group (non-parents and parents with children 15-21). Our results remain similar to the DD method. Thus, the negative effects of the policy on child care, tobacco, and clothing for very young children spending persist. Similarly, the positive effects of the policy on household appliance, transportation, gasoline, health, education and human category spending are still significant. Some significant positive effects on other consumer items, such as men and boys' clothing, computers, or recreation, are also observed. Finally, the estimates indicate that the reform has a positive significant effect on total household consumption.

In sum, there is some indication that families changed their consumption patterns after the childcare reform. Indeed, families spent more in work-related expenses, such as transportation, gasoline, public transport, appliances, and personal care. Childcare policy is also associated with a statistically significant increase in spending on children (health, education, reading) and goods and services having a collective aspect (leisure, computer) and a decrease in tobacco expenses.

5.2 Robustness checks and subgroup findings

In Table 5, we present our estimates from a number of robustness checks. Clustering on province/pre- and post-policy period does not produce results that differ from those presented in Table 4 (clustering on province alone does not assume a temporal break in the dependance). However, now we can report that the policy has a positive and significant effect on food in restaurants, and the negative effects for the clothes of young children become insignificant. In the following columns, we disaggregate the post-reform period into three year groups : 2001-2003, 2004-2007, and 2008-2009. This process takes account of the gradual implementation of the policy (new childcare spaces created each year) and the financial crisis of 2008. We further note several facts. First, the lower spending on childcare is becoming smaller over the years due to the fact that the capacity constraint was released, and thus, more families have access to subsidized childcare. Second, the effects of the policy on work-related expenses

are significant throughout the years studied. Third, children and family well-being- related expenses are especially important from 2004 onward. This can be explained by the fact that more families have had access to subsidized childcare following the increase in the number of subsidized spaces over the years (Lefebvre et al., 2009). Another possibility is that the response time by families may need to be invested in expenses related to the children and family well-being, while work-related expenses are instantaneous. Finally, the increase in shelter expenditures in 2008-2009 is consistent with the sub-prime crisis, but this event does not seem to have significantly affected the other expenditure items. It is the same for food purchased in stores during the food crisis in late 2007.

In Table 6, we investigate whether the estimated effects differ according to household income. For child care spending, we find that the policy has a positive effect on low-income families and a negative effect on high-income families. This finding is consistent with the evidence provided by Lefebvre and Merrigan (2008) because the change in child-care policy implemented in 1997 had different impacts on child-care costs depending on family income [13]. Low-income families were possibly encouraged to enter the labor market due to a substantial supply of regulated childcare at a single fee per day and greater flexibility ; thus childcare expenditures increased [14]. However, for high-income families (and thus those probably having a high level of education), these individuals already had a strong incentive to participate in the labor market before the reform. So universal childcare subsidies have essentially just reduced the fee for childcare. Regarding other expenditures, the estimates suggest that childcare policy has a significant effect on all families. Nevertheless, the reform mainly affected low-income families, particularly the expenses related to children and family well-being (health, education, and clothing). It also seems that the reform reduced the gap in consumption between low- and high-income families because we can report a positive and significant effect on total consumption ($2,812).

5.3 The persistence of policy effects

The next set of results shows whether the observed effects on expenditures for families who benefited from the program when their child was less than 6, persist into school age.

13. This finding is explained by the structure of the policy in Quebec before the regime switch, wherein childcare expenses were reduced via a refundable tax credit that was considerably higher for low-income families. There was, and still is, a federal deduction for child-care expenses. This deduction is based on the income of the lowest earner in the household. The overall impact of these fiscal measures have reduced child-care costs for families in Quebec (provided expense receipts were included with tax returns). Once the refundable tax credit and federal deduction are considered, for a gross price of $25.00 per day for day-care services, middle-income families paid approximately $11.00 per day, while the net price could be as low as $5.00 for low-income families. Thus, before 1997, families faced a nonlinear pricing schedule with greater price reductions for low-income families. The new policy set prices at $5.00 per day for everyone after 1997. The federal deduction continues to affect the net price of childcare in Quebec, but it is less important, as the deduction is now much smaller. Hence, after September 1997, high-income families and middle-income families saw a larger price reduction than did lower-income families.

14. Low-fee childcare is available from 10 to 12 hours a day (depending on the type of care : center- or family-based), 260 days per year, at a single fee of $7 for all children. The Quebec government requires that parents use these services every day of the week (unless the child is ill or on vacation with his parents). Indeed, if a space isn't occupied full time, the subsidy may be reduced. Although childcare can offer part-time spaces, in almost all cases they only offer full-time places because they are easier to manage (Haeck et al., 2015).

Table 7 presents the difference-in-differences estimates for families where the youngest child is age 0-5 years, 6-12 years or 0-12 years. We start with the full sample and then present the estimates by family income.

For families whose youngest child was between 6 and 12 years, childcare spending ($170) increased after the reform. This finding is consistent with the implementation of before- and after-school daycare to children for ages 5-12 on school premises. Before this policy, there was very little or no care at school. We also show that the effects on spending related to children and family well-being (health, education, reading, human, clothing, and tobacco) are consistent with those for families with children age 0-5. However, for work-related expenses, the effects become insignificant. One possible explanation for this finding is that families no longer have work-childcare trips. For families whose youngest child is between 0 and 12 years and who was affected by the policy, we found that the reform increases work-related expenditures (food from restaurants, transportation, gasoline, public transportation) as well as expenditures related to children and families (health, education, reading, human, clothing) and total consumption.

We now turn to disaggregating the long-term effects of the policy by family income. We find that the effects on expenditures are larger and significant for low-income families, regardless of the age of the child. We also can report that, for low-income families, the effects are larger and significant when the child is 0-5 years that when he or she starts school.

6 Conclusion

This paper investigates how household expenditures were affected by the Quebec childcare reform. The policy had two major objectives : increase mothers' participation in the labor market, and enhance child development and equality of opportunities for children. Previous studies have shown that this policy has significantly increased mother's participation in the labor market as well as the proportion of children who are attending subsidized childcare. However, little is known about the improvement of equality of opportunities for children when using consumption as the measure. The impact of the policy on the expenditures for several goods and services were thus estimated using SHS data and a DD/DDD approach.

The results show that patterns of expenditures changed after the reform for two-parent families whose the youngest child was between 0 and 5 years. Indeed, we find that childcare policy is associated with increases in work-related expenses, such as transportation, gasoline, appliances, and food away from home and decreases in childcare expenses. This result is consistent with the program's large labor supply effects and its childcare subsidies. Expenditures related to children, family goods and services having a collective aspect, such as health and education, increased while tobacco expenses decreased because of the policy. We also find that low-income households reacted more strongly to the policy, suggesting that inequalities between low- and high-income families in terms of consumption decreased with the program. Finally, the estimates show that although the effects persist until the child is between 6-12 years, the size of the effect decreases strongly.

All our results are consistent with previous studies on work support programs (Gregg et al., 2006 ; Goodman-Bacon et al., 2008 ; Patel, 2011). This study therefore completes the evaluation of the mechanisms of subsidized child care policy by analyzing the effect on poverty

through consumption. These changes in expenditures can have an impact on children and parents' well-being, although the quality of childcare and program structure also do play an important role and can reverse these positive results (Baker et al., 2008 ; Lebihan et al., 2015).

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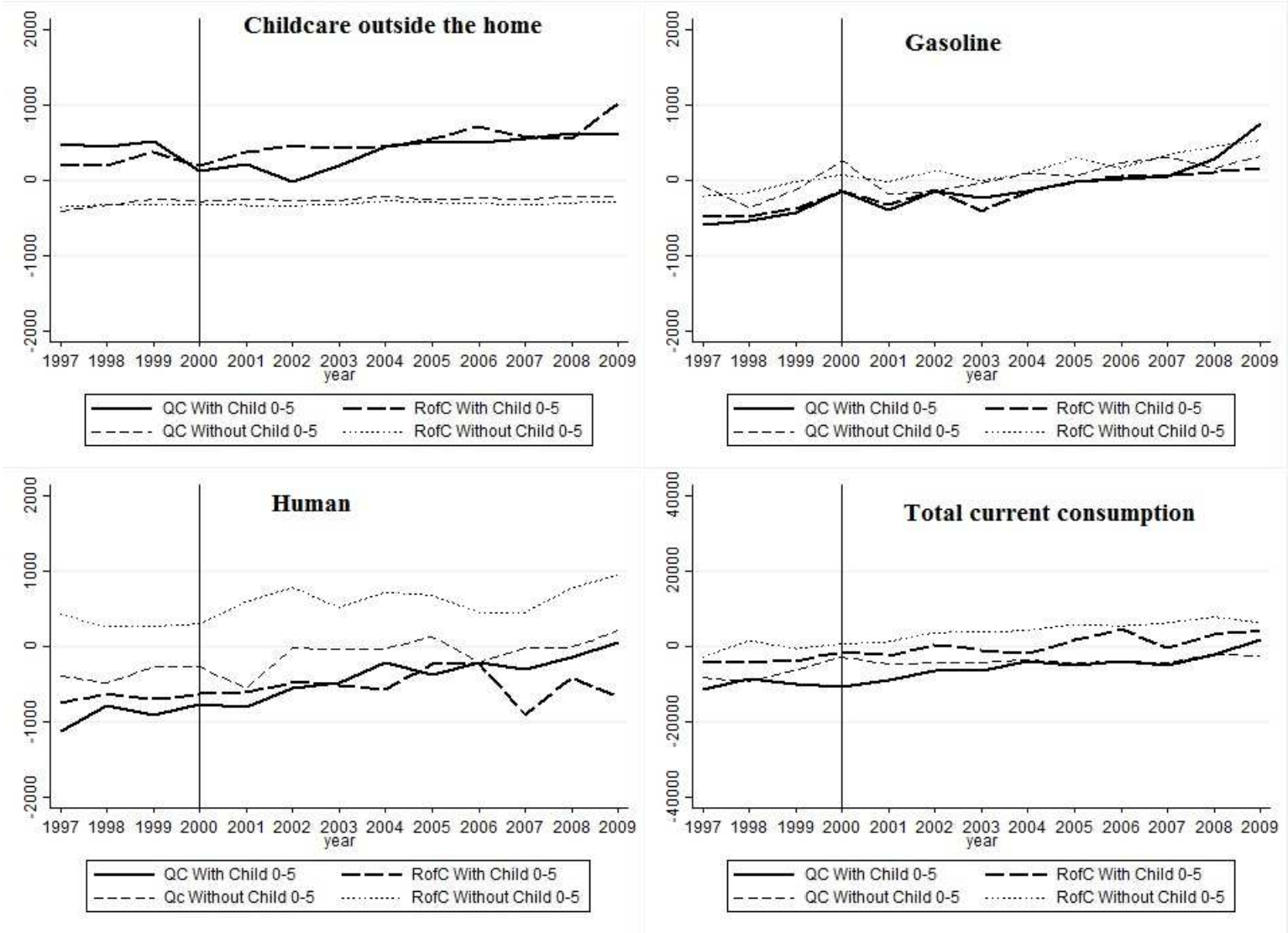
FIGURE 1 – Expenditures (residuals), 1997-2009



Notes: The values plotted are the average residuals by year, province of residence and parental status from a regression of household expenditures on control variables listed in Section 3. All estimates are weighted and the vertical line marks the first year of full implementation of the policy.

TABLE 1 – Eligibility for the Quebec childcare program

Year of observation	Age 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1997	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	1	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	1	2	2	2	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	1	2	3	3	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2003	1	2	3	4	4	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
2004	1	2	3	4	5	4	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0
2005	1	2	3	4	5	5	4	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0
2006	1	2	3	4	5	5	5	4	3	3	2	2	1	1	0	0	0	0	0	0	0	0
2007	1	2	3	4	5	5	5	5	4	3	3	2	2	1	1	0	0	0	0	0	0	0
2008	1	2	3	4	5	5	5	5	5	4	3	3	2	2	1	1	0	0	0	0	0	0
2009	1	2	3	4	5	5	5	5	5	5	4	3	3	2	2	1	1	0	0	0	0	0

Notes: This table shows the eligibility for the Quebec daycare reform for a child reaching the given age in the given year. The grey shaded area highlights the post-reform years, while the unshaded area refers to the pre-reform years. The numbers indicate the number of years of eligibility for subsidized childcare. Children born in 1995 (age 2 years in 1997) and in 1996 (age 1 in 1997) are excluded from the analysis (framed in black).

TABLE 2 – Spending variables summary statistics

	Quebec Parents 0-5		RofC Parents 0-5		Quebec Non Parents 0-5	
Variables	Pre-Policy	Post-Policy	Pre-Policy	Post-Policy	Pre-Policy	Post-Policy
Food, all	7,990.835	8,062.768	7,577.900	7,580.401	7,733.46	7,614.11
	(3011.762)	(3181.626)	(3052.310)	(3285.434)	(3340.987)	(3435.709)
Food from stores	6,642.870	6,609.615	6,139.343	6,122.722	6,016.32	5,838.10
	(2468.211)	(2645.247)	(2482.234)	(2654.731)	(2713.594)	(2797.595)
Food from restaurants	1,298.013	1,391.463	1,408.701	1,414.061	1,675.69	1,749.58
	(1363.995)	(1400.034)	(1418.877)	(1455.536)	(1626.348)	(1679.305)
Household operation	3,735.447	4,221.357	4,346.747	5,090.763	2,153.08	2,604.36
	(3053.649)	(2811.996)	(3680.069)	(4292.303)	(1299.224)	(1915.593)
Child care outside	1,333.009	1,456.076	1,247.352	1,665.041	1.189	0.543
the home	(1958.640)	(1648.506)	(2404.944)	(3033.186)	(49.586)	(19.575)
Household furnishings	1,582.707	2,182.036	1,977.494	2,571.483	1,709.17	2,235.20
and equipment	(2316.846)	(2623.572)	(2183.493)	(3041.475)	(2056.464)	(2861.828)
Household appliances	292.072	444.102	382.961	479.247)	373.415	453.056
	(599.008)	(929.280)	(677.961)	(935.630)	(732.972)	(903.330)
Shelter	10,570.859	1,1691.982	14,658.516	1,5561.939	9,643.66	9,758.94
	(5095.991)	(6025.957)	(8076.906)	(8985.089)	(5928.706)	(5343.028)
Transportation	4,710.005	5,808.45	5,529.866	6,273.340	6,071.82	6,041.62
	(3197.987)	(3539.596)	(3570.311)	(3973.588)	(4118.503)	(3818.363)
Gasoline	1,751.698	2,221.470	1,818.795	2,155.731	2,104.26	2,264.56
	(1247.416)	(1569.629)	(1320.756)	(1621.920)	(1491.925)	(1673.197)
Public transportation	365.698	521.763	634.391	742.347	576.895	550.399
	(848.258)	(1096.862)	(1317.435)	(1409.161)	(1060.572)	(975.961)
Health	1,219.760	1,707.134	1,241.125	1,420.007	1,471.63	1,929.45
	(1164.734)	(1458.248)	(1267.193)	(1720.876)	(1356.833)	(1677.649)
Education	448.985	603.372	672.515	764.643	930.425	849.251
	(982.963)	(1419.736)	(1770.924)	(2164.388)	(1729.054)	(1740.626)
Reading	242.182	196.137	292.625	237.474	320.553	256.508
	(279.785)	(243.015)	(307.938)	(308.325)	(349.011)	(336.316)
Human	1,910.926	2,506.643	2,206.265	2,422.124	2,722.61	3,035.21
	(1690.769)	(2247.073)	(2405.841)	(2995.796)	(2535.841)	(2658.412)
Recreation	2,108.691	3,987.286	2,622.060	4,644.798	2,403.04	4,256.31
	(1712.616)	(3408.097)	(2063.174)	(3900.027)	(2131.171)	(3992.722)
Computers	214.306	316.810	258.887	355.577	306.047	430.837
	(602.544)	(756.705)	(649.951)	(900.197)	(830.443)	(932.723)
Clothing, all	2,341.025	2,731.862	2,179.893	2,646.137	2,456.62	2,710.83
	(1857.522)	(2005.014)	(1775.277)	(2367.672)	(2042.221)	(2322.476)
Clothing, child 0-3 years	304.675	412.013	296.873	390.992	0.000	0.000
	(506.432)	(501.588)	(386.242)	(521.224)	(0.000)	(0.000)
Clothing, women and girls	1,104.858	1,293.816	995.054	1,292.557	1,388.96	1,594.21
	(952.884)	(1187.315)	(1041.043)	(1431.423)	(1293.689)	(1517.494)
Clothing, men and boys	925.067	1,049.573	879.742	992.510	1,067.66	1,116.62
	(878.855)	(967.477)	(859.976)	(1068.598)	(1104.330)	(1151.482)
Personal care	1,055.604	1,312.277	1,055.452	1,351.102	886.709	1132.283
	(688.215)	(846.116)	(695.448)	(872.428)	(678.528)	(822.106)
Tobacco	785.736	501.911	594.548	463.655	1,078.51	836.426
	(1231.611)	(1049.426)	(1112.073)	(1038.662)	(1449.085)	(1466.164)
Alcohol	659.313	588.973	693.481	574.135	1,171.65	964.445
	(841.502)	(895.906)	(1073.998)	(852.988)	(1445.980)	(1175.088)
Chance games	165.533	107.351	174.354	151.236	255.422	201.059
	(324.974)	(261.585)	(404.409)	(752.898)	(452.043)	(421.442)
Total current consumption	42,482.141	48,250.647	49,954.947	54,611.411	44,741.84	47,168.92
	(18497.310)	(19184.349)	(21216.160)	(24997.977)	(20180.174)	(21553.556)
N	669	1,523	3,992	9,391	1,156	2,149

Notes : This table shows the mean, standard deviation (in parentheses) and number of observations for each variable of interest for Quebec and the Rest of Canada before and after the reform. Each column represents the age category of the youngest child : 0-5 years and non-parents with 15-21 years.

TABLE 3 – Estimated effects of childcare policy on mothers and fathers' labor outcomes

Variables	mean	β_3 (2001-2009)
Mothers' participation	0.70	0.060***
	(0.46)	(0.012)
Fathers' participation	0.95	0.006**
	(0.23)	(0.003)
Mothers' annual weeks	20.73	1.982***
worked full-time	(22.66)	(0.280)
Mothers' annual weeks	6.00	1.215*
worked part-time	(13.99)	(0.621)
Fathers' annual weeks	43.65	-0.114
worked full-time	(16.00)	(0.720)
Fathers' annual weeks	1.42	0.133
worked part-time	(7.11)	(0.165)
Mothers' annual	19,286.48	3,291.101***
total income	(17321.93)	(447.467)
Fathers' annual	40,929.33	1,248.423
total income	(25626.82)	(1,842.456)
Household annual	60,377.71	4,625.641*
total income	(33293.69)	(2,284.881)
Mothers' annual	14,947.74	2,557.605***
earnings	(17998.92)	(384.803)
Fathers' annual	37,864.53	1,545.837
earnings	(26275.07)	(1,858.254)
N	15,566	

Notes : This table displays the pre-program mean for Quebec province and the estimated coefficients using a DD approach (Equation 1). All estimates are for families in which the youngest child is 0-5 years and the estimates are weighted. Robust standard errors are in parentheses, clustered by province.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 4 – Estimated effects of childcare policy on annual family expenditures

Variables	Mean	DD	DDD
		β_3	β_7
Food, all	$7,990.84	271.108	226.637
	(3011.76)	(217.805)	(133.885)
Food from stores	$6,642.87	165.917	229.308**
	(2468.21)	(137.796)	(95.655)
Food from restaurants	$1,298.01	102.507	-19.331
	(1363.99)	(68.824)	(32.326)
Household operation	$3,735.45	-167.615	-153.306
	(3054.65)	(112.674)	(106.130)
Child care outside	$1,333.01	-257.649***	-290.992***
the home	(1958.64)	(28.729)	(31.616)
Household furnishings	$1,582.71	20.972	-61.123
and equipment	(2316.85)	(122.763)	(77.412)
Household appliances	$292.07	64.116**	49.643***
	(599.01)	(21.375)	(4.344)
Shelter	10,570.86	293.249	711.122**
	(5095.99)	(402.499)	(311.959)
Transportation	$4,710.01	393.142***	939.691***
	(3197.99)	(39.306)	(143.357)
Gasoline	$1,751.70	166.602***	288.703***
	(1247.42)	(44.975)	(27.557)
Public transportation	$365.70	46.642**	99.733
	(848.26)	(19.949)	(57.558)
Health	$1,219.76	360.698***	107.911*
	(1164.73)	(45.244)	(57.007)
Education	$448.99	122.417*	230.544***
	(982.96)	(55.931)	(63.504)
Reading	$242.18	17.812**	4.502
	(279.79)	(6.350)	(4.110)
Human	$1,910.93	500.927***	342.957***
	(1690.77)	(43.813)	(89.104)
Recreation	$2,108.69	-62.522	318.961**
	(1712.62)	(85.650)	(119.585)
Computers	$214.31	4.526	33.042*
	(602.54)	(9.256)	(16.309)
Clothing, all	$2,341.03	-30.152	166.128
	(1857.52)	(72.654)	(108.954)
Clothing, child 0-3 years	$304.68	-19.390**	-14.696*
	(506.43)	(8.367)	(7.965)
Clothing, women and girls	$1,104.86	-70.453	65.005
	(952.88)	(39.417)	(60.179)
Clothing, men and boys	$925.07	49.106	105.869*
	(878.86)	(29.336)	(47.542)
Personal care	$1,055.60	-49.189	85.718*
	(688.22)	(36.259)	(43.522)
Tobacco	$785.74	-150.970***	-108.720**
	(1231.61)	(16.771)	(36.382)
Alcohol	$659.31	60.660	81.744*
	(841.50)	(49.459)	(38.585)
Chance games	$165.53	-29.914	-17.206
	(324.97)	(24.237)	(29.980)
Total current consumption	$42,482.14	1,904.566	3,246.836**
	(18497.31)	(1,780.448)	(1,419.408)
N		15,566	39,674

Notes : This table displays the pre-program mean for Quebec province and the estimated coefficients using a DD/DDD approach. All estimates are for families in which the youngest child is 0-5 years and the estimates are weighted. Robust standard errors are in parentheses, clustered by province.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 5 – Robustness checks

	Province-pre/post cluster		Impacts by group of years					
Variables	DD	DDD		DD			DDD	
	β_3	β_7	2001-2003	2004-2007	2008-2009	2001-2003	2004-2007	2008-2009
Food, all	271.108	226.637*	178.589	268.004	398.627	161.586	162.655	423.906***
	(169.981)	(110.970)	(129.126)	(227.863)	(318.814)	(116.533)	(150.552)	(112.097)
Food from stores	165.917	229.308**	23.780	128.337	420.582*	102.693	176.909	478.235***
	(118.887)	(80.571)	(74.965)	(142.887)	(216.611)	(62.905)	(106.489)	(110.087)
Food from restaurants	102.507*	-19.331	151.859**	114.467	16.031	24.643	-32.809	-47.156
	(49.951)	(69.749)	(54.060)	(72.854)	(83.779)	(46.451)	(42.540)	(38.527)
Household operation	-167.615	-153.306	-308.788***	-57.339	-178.978	-472.568***	-60.769	141.351
	(180.561)	(206.244)	(88.063)	(113.234)	(154.458)	(114.333)	(146.973)	(81.818)
Child care outside	-257.649*	-290.992*	-388.450***	-208.412***	-173.389***	-431.668***	-205.741***	-262.707***
the home	(135.484)	(164.103)	(30.624)	(29.011)	(34.596)	(56.180)	(47.264)	(68.144)
Household furnishings	20.972	-61.123	-125.942	109.796	55.589	-254.478*	-30.498	161.409
and equipment	(99.822)	(154.664)	(70.187)	(128.985)	(183.975)	(128.783)	(52.372)	(104.038)
Household appliances	64.116***	49.643**	26.534**	57.766**	125.028**	-13.651	48.988**	137.783***
	(19.745)	(21.442)	(11.620)	(22.934)	(38.941)	(14.827)	(15.359)	(26.223)
Shelter	293.249	711.122**	-103.606	-37.731	1,409.069*	426.344	289.713	1,810.475***
	(739.114)	(250.853)	(261.655)	(433.419)	(627.393)	(470.146)	(229.387)	(330.598)
Transportation	393.142***	939.691***	271.282**	154.252***	981.553***	856.272***	560.572***	1,743.644***
	(113.562)	(143.357)	(89.009)	(39.819)	(65.882)	(219.073)	(99.170)	(127.266)
Gasoline	166.602**	288.703***	97.228***	83.108	407.563***	201.285***	132.935***	698.912***
	(59.764)	(54.432)	(28.731)	(47.544)	(71.218)	(25.670)	(35.367)	(32.263)
Public transportation	46.642	99.733*	106.600***	-12.283	73.114*	181.957***	-17.351	209.620***
	(52.390)	(51.461)	(14.520)	(21.210)	(33.978)	(47.698)	(68.188)	(56.098)
Health	360.698**	107.911	262.423***	403.698***	413.250***	86.738	172.944**	-9.668
	(168.743)	(72.984)	(39.075)	(48.297)	(61.314)	(55.775)	(54.177)	(72.062)
Education	122.417***	230.544	-38.853	108.650*	359.660***	142.189*	135.291*	525.293***
	(41.184)	(135.026)	(62.638)	(53.547)	(57.704)	(75.859)	(66.589)	(87.131)
Reading	17.812*	4.502	-4.783	26.455***	32.124***	-11.761*	9.202*	17.072***
	(10.258)	(10.624)	(5.645)	(6.820)	(8.698)	(6.046)	(4.458)	(4.090)
Human	500.927***	342.957***	218.787***	538.803***	805.033***	217.167*	317.436***	532.696***
	(173.563)	(106.629)	(65.012)	(44.847)	(35.202)	(114.321)	(70.462)	(107.354)
Recreation	-62.522	318.961**	-10.140	-212.066**	136.206	400.127***	422.376**	-40.139
	(95.814)	(130.931)	(81.187)	(82.157)	(107.133)	(100.480)	(144.558)	(169.612)
Computers	4.526	33.042*	-17.671	34.655***	-20.163	93.018***	71.793**	-134.850***
	(9.822)	(18.302)	(11.340)	(8.526)	(11.164)	(21.476)	(27.019)	(32.305)
Clothing, all	-30.152	166.128*	-160.765**	-53.417	183.688*	-173.737	170.136*	641.778***
	(87.993)	(88.722)	(61.888)	(72.823)	(92.636)	(100.135)	(91.496)	(155.729)
Clothing, child 0-3 years	-19.390	-14.696	-59.326***	-3.777	5.297	-70.638***	-8.400	48.964***
	(18.422)	(22.989)	(11.380)	(8.121)	(7.326)	(14.901)	(8.100)	(5.704)
Clothing, women and girls	-70.453	65.005	-113.278***	-99.515**	38.040	-85.977	22.652	366.859***
	(42.962)	(56.910)	(32.326)	(39.849)	(52.587)	(62.307)	(45.012)	(84.731)
Clothing, men and boys	49.106	105.869**	-0.885	42.902	126.117**	-25.007	145.342**	214.546**
	(32.583)	(39.755)	(22.428)	(29.410)	(41.165)	(28.972)	(45.852)	(78.578)
Personal care	-49.189	85.718**	-9.419	-16.731	-159.735**	26.154	94.145*	174.641**
	(36.953)	(38.547)	(21.448)	(38.964)	(62.057)	(26.002)	(47.948)	(67.832)
Tobacco	-150.970***	-108.720**	23.285*	-244.271***	-213.612***	-187.351***	-61.897*	-69.541
	(34.224)	(38.106)	(11.051)	(18.791)	(25.633)	(24.978)	(30.626)	(70.589)
Alcohol	60.660	81.744*	133.971***	31.515	16.204	130.764***	124.078*	-71.145*
	(37.871)	(43.028)	(39.027)	(51.603)	(59.739)	(27.235)	(60.690)	(35.555)
Chance games	-29.914	-17.206	-5.424	-38.292	-47.195	-6.105	-28.525	-9.864
	(17.770)	(27.069)	(18.423)	(24.986)	(31.209)	(18.922)	(45.138)	(21.994)
Total current consumption	1,904.566	3,246.836**	1,182.594	1,305.332	3,929.318	1,181.260	3,410.052**	5,747.786***
	(1,652.670)	(1,145.146)	(1,144.187)	(1,859.940)	(2,493.628)	(1,444.109)	(1,418.606)	(1,362.664)
N	15,566	39,674		15,566			39,674	

Notes : This table displays the estimated coefficients and standard errors using a DD/DDD approach. All estimates are for families in which the youngest child is 0-5 years and the estimates are weighted.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 6 – Estimated effects of childcare policy by family income

	DD		DDD	
Variables	Low-income	High-income	Low-income	High-income
	β_3	β_3	β_7	β_7
Food, all	370.130**	46.134	458.101**	-0.725
	(127.452)	(232.760)	(191.863)	(129.799)
Food from stores	304.466**	-5.482	385.014**	85.454
	(122.180)	(140.952)	(158.382)	(84.764)
Food from restaurants	26.850	64.631	49.755	-98.972**
	(19.410)	(76.215)	(42.581)	(36.782)
Household operation	750.396***	-688.855***	670.025***	-715.528***
	(97.997)	(84.582)	(84.988)	(97.070)
Child care outside	426.963***	-593.487***	370.148***	-662.883***
the home	(60.009)	(53.905)	(67.833)	(72.019)
Household furnishings	334.270***	-159.357	213.791	-278.787*
and equipment	(56.738)	(160.728)	(173.912)	(151.561)
Household appliances	86.413***	51.422	-10.403	52.017***
	(13.481)	(28.315)	(56.027)	(15.462)
Shelter	-276.300	206.471	260.734	507.751
	(166.930)	(499.483)	(386.779)	(431.074)
Transportation	323.334	191.334**	585.639***	880.344***
	(223.91)	(71.968)	(119.085)	(162.807)
Gasoline	220.727***	60.543	295.163***	201.771***
	(39.845)	(56.259)	(38.569)	(32.912)
Public transportation	134.930*	18.018	194.488***	53.616
	(65.489)	(32.659)	(33.581)	(72.507)
Health	325.975***	301.209***	163.259**	28.585
	(45.141)	(51.445)	(69.049)	(70.966)
Education	369.870***	-7.805	507.351***	78.401
	(75.534)	(56.002)	(77.320)	(73.755)
Reading	10.638	10.211	25.143	-9.752
	(7.359)	(6.907)	(16.149)	(5.744)
Human	706.484***	303.615***	695.753***	97.235
	(107.168)	(41.457)	(135.546)	(102.370)
Recreation	120.786	-205.994**	168.596	189.207*
	(79.434)	(69.433)	(138.803)	(100.153)
Computers	63.285	-26.444*	44.728	19.067
	(45.896)	(12.357)	(49.594)	(29.230)
Clothing, all	135.228*	-231.350**	196.235***	0.272
	(64.347)	(96.168)	(30.950)	(136.557)
Clothing, child 0-3 years	25.907*	-55.136***	28.227**	-49.152***
	(12.487)	(9.308)	(9.607)	(7.140)
Clothing, women and girls	17.937	-166.761**	57.343**	-9.156
	(34.219)	(54.642)	(22.608)	(75.918)
Clothing, men and boys	84.160***	-20.353	103.331***	48.727
	(19.836)	(36.830)	(14.594)	(60.531)
Personal care	5.668	-101.992**	74.967**	51.134
	(17.589)	(42.138)	(28.730)	(50.085)
Tobacco	-197.596***	-113.214***	-139.687**	-56.572
	(36.646)	(16.674)	(56.628)	(33.758)
Alcohol	12.098	45.388	176.208***	41.759
	(29.302)	(62.553)	(30.099)	(49.065)
Chance games	-21.980	-29.965	-22.011	-14.116
	(15.137)	(33.200)	(20.239)	(38.740)
Total current consumption	2,812.474***	-81.062	4,751.422***	994.767
	(349.261)	(2,056.172)	(749.965)	(1,817.137)
N	4,365	11,201	11,533	28,141

Notes : This table displays the estimated coefficients and standard errors using a DD/DDD approach by family income. All estimates are for families in which the youngest child is 0-5 years and the estimates are weighted. Robust standard errors are in parentheses, clustered by province.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 7 – Long-term estimated effects of childcare policy

	All			Low income			High income		
Variables	Parents 0-5	Parents 6-12	Parents 0-12	Parents 0-5	Parents 6-12	Parents 0-12	Parents 0-5	Parents 6-12	Parents 0-12
	β_3	β_3	β_3	β_3	β_3	β_3	β_3	β_3	β_3
Food, all	271.108	190.542	141.813	370.130**	-187.743**	-20.674	46.134	73.780	18.823
	(217.805)	(192.401)	(161.970)	(127.452)	(81.211)	(56.573)	(232.760)	(172.068)	(153.291)
Food from stores	165.917	105.672	-1.240	304.466**	-88.261	-56.437	-5.482	13.732	-99.129
	(137.796)	(99.954)	(83.122)	(122.180)	(64.987)	(57.950)	(140.952)	(81.903)	(77.786)
Food from restaurants	102.507	109.098	176.301**	26.850	-132.415***	10.720	64.631	108.776	175.645**
	(68.824)	(93.000)	(71.041)	(19.410)	(34.769)	(26.376)	(76.215)	(96.983)	(68.041)
Household operation	-167.615	411.506***	12.652	750.396***	570.546***	554.030***	-688.855***	285.398***	-256.150***
	(112.674)	(45.631)	(44.606)	(97.997)	(47.527)	(42.439)	(84.582)	(27.034)	(23.444)
Child care outside	-257.649***	169.828***	-126.746**	426.963***	396.630***	358.413***	-593.487***	83.133	-311.204***
the home	(28.729)	(38.901)	(49.358)	(60.009)	(11.928)	(33.928)	(53.905)	(52.202)	(80.939)
Household furnishings	20.972	0.897	97.209	334.270***	5.637	320.167***	-159.357	-56.331	-43.326
and equipment	(122.763)	(111.866)	(119.827)	(56.738)	(186.675)	(32.413)	(160.728)	(82.256)	(134.804)
Household appliances	64.116**	-3.065	35.315	86.413***	-1.627	84.155***	51.422	-7.574	8.411
	(21.375)	(48.681)	(24.882)	(13.481)	(92.539)	(15.017)	(28.315)	(37.831)	(25.721)
Shelter	293.249	828.730*	289.983	-276.300	833.274*	21.881	206.471	561.260	134.441
	(402.499)	(372.302)	(396.269)	(166.930)	(445.790)	(224.946)	(499.483)	(310.429)	(397.216)
Transportation	393.142***	95.144	398.329***	323.334	282.710	355.693**	191.334**	-168.950	226.006***
	(39.306)	(120.048)	(33.420)	(223.391)	(180.387)	(128.485)	(71.968)	(122.681)	(24.948)
Gasoline	166.602***	38.434	195.691***	220.727***	92.283	196.477***	60.543	-33.620	132.752***
	(44.975)	(78.446)	(42.937)	(39.845)	(112.747)	(21.772)	(56.259)	(96.896)	(39.457)
Public transportation	46.642**	12.221	59.815***	134.930*	226.844***	159.063***	18.018	-54.207*	19.833**
	(19.949)	(27.512)	(7.586)	(65.489)	(42.331)	(32.460)	(32.659)	(25.502)	(6.313)
Health	360.698***	172.334***	251.623***	325.975***	235.234*	267.445**	301.209***	92.591***	188.663***
	(45.244)	(24.008)	(21.761)	(45.141)	(118.608)	(98.353)	(51.445)	(20.866)	(15.783)
Education	122.417*	150.369***	131.220***	369.870***	-44.249	201.719**	-7.805	159.252***	60.578*
	(55.931)	(41.103)	(35.647)	(75.534)	(76.493)	(82.953)	(56.002)	(36.449)	(27.487)
Reading	17.812**	49.063***	42.913***	10.638	-6.227	8.870	10.211	56.536***	44.970***
	(6.350)	(7.466)	(7.723)	(7.359)	(12.894)	(7.459)	(6.907)	(3.589)	(5.641)
Human	500.927***	371.766***	425.756***	706.484***	184.757	478.035**	303.615***	308.379***	294.211***
	(43.813)	(36.470)	(45.418)	(107.168)	(109.984)	(163.655)	(41.457)	(44.332)	(27.406)
Recreation	-62.522	327.818	238.873	120.786	-158.222*	150.667**	-205.994**	349.979	187.309
	(85.650)	(251.748)	(139.276)	(79.434)	(84.032)	(59.311)	(69.433)	(268.725)	(128.999)
Computers	4.526	-4.880	7.387	63.285	-129.408***	1.654	-26.444*	28.844	0.347
	(9.256)	(37.912)	(19.914)	(45.896)	(21.158)	(15.418)	(12.357)	(42.563)	(16.967)

TABLE 7 – (Continued)

	All			Low income			High income		
Variables	Parents 0-5	Parents 6-12	Parents 0-12	Parents 0-5	Parents 6-12	Parents 0-12	Parents 0-5	Parents 6-12	Parents 0-12
	β_3	β_3	β_3	β_3	β_3	β_3	β_3	β_3	β_3
Clothing, all	-30.152	220.597***	131.089**	135.228*	-487.028***	-8.919	-231.350**	289.925***	78.214
	(72.654)	(58.414)	(53.833)	(64.347)	(72.592)	(73.457)	(96.168)	(68.803)	(61.421)
Clothing, child 0-3 years	-19.390**	0.000	8.477*	25.907*	0.000	22.470**	-55.136***	0.000	-1.263
	(8.367)	(0.000)	(4.206)	(12.487)	(0.000)	(8.517)	(9.308)	(0.000)	(3.360)
Clothing, women and girls	-70.453	123.454***	38.590	17.937	-318.966***	-75.483	-166.761**	186.752***	28.211
	(39.417)	(25.530)	(34.106)	(34.219)	(53.361)	(45.230)	(54.642)	(33.635)	(41.501)
Clothing, men and boys	49.106	97.143**	79.140***	84.160***	-168.062***	40.601*	-20.353	103.173**	46.036*
	(29.336)	(35.314)	(23.040)	(19.836)	(24.830)	(21.162)	(36.830)	(36.452)	(23.711)
Personal care	-49.189	14.810	2.028	5.668	-72.636*	15.299	-101.992**	1.217	-29.786
	(36.259)	(24.554)	(28.515)	(17.589)	(37.146)	(18.161)	(42.138)	(30.540)	(33.270)
Tobacco	-150.970***	-115.994***	-167.386***	-197.596***	-129.528**	-203.146***	-113.214***	-83.628**	-137.018***
	(16.771)	(20.106)	(20.716)	(36.646)	(51.471)	(39.333)	(16.674)	(36.753)	(24.892)
Alcohol	60.660	-17.174	23.940	12.098	-125.221***	-22.941	45.388	-33.114	7.778
	(49.459)	(72.711)	(60.943)	(29.302)	(29.302)	(14.045)	(62.553)	(76.568)	(67.706)
Chance games	-29.914	6.242	-19.488	-21.980	-16.198	-27.760*	-29.965	12.397	-20.281
	(24.237)	(12.776)	(12.801)	(15.137)	(28.896)	(14.703)	(33.200)	(10.193)	(14.235)
Total current consumption	1,904.566	4,335.445**	2,961.397*	2,812.474***	1,223.699*	2,550.925***	-81.062	3,595.943*	1,605.683
	(1,780.448)	(1,684.455)	(1,543.280)	(349.261)	(592.197)	(367.663)	(2,056.172)	(1,598.045)	(1,557.988)
N	15,566	12,354	27,920	4,365	3,482	7,825	11,201	8,872	20,095

Notes : This table displays the estimated coefficients and standard errors using a DD approach. All estimates are for families who benefited from the program when their youngest child was less than 6 : 0-5 years, 6-12 years and 0-12 years. Robust standard errors are in parentheses, clustered by province.
*** : significant at 1% ; ** : significant at 5% ; ;* : significant at 10%

Financial Support and Family Outcomes in Quebec

Catherine Haeck, Laëtitia Lebihan, Pierre Lefebvre and Philip Merrigan *

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Using an instrumental variables strategy, we estimate the causal effect of family income on child and mother outcomes (education, behavior, physical and mental health) in Quebec. Our identification is derived from policy changes in child benefit and tax assistance across time, number of children, and marital status. Using data from the National Longitudinal Survey of Children and Youth, and the Survey of Labour and Income Dynamics, our results reveal that financial support (child benefits and tax assistance) to families has a positive impact on child and mother outcomes. An increase in financial support decreases the probability for the child to repeat a grade and to have a learning disability. It also reduces behavioral and nutritional problems of children, and the mother's health is improved.

Keys words : child benefits, tax assistance, children's education and health

JEL Classification : I12, I31, I38, J13

*Université du Québec à Montréal. The analysis is based on Statistics Canada's restricted-access Micro Data Files who are available at the Quebec Interuniversity Centre for Social Statistics (QICSS). This research was funded by the Fonds Québécois de la Recherche sur la Société et la Culture. All computations on these microdata were prepared by the authors, who assume responsibility for the use and interpretation of these data.

1 Introduction

To reduce child poverty and to achieve distributional and equity goals, many developed countries have implemented income transfer policies to families with children. In Canada, federal expenditures on child benefits have significantly increased in recent years, from $7.2 billion in 1995 to $13.2 billion in 2012 (Government of Canada, 2013). [1]. Despite these major expenditures, the poverty rate of children in Canada amounted to over 14% in 2010 (UNICEF, 2011), leading many child advocates to continue to campaign for increased child benefits.

There are two potential channels by which income influences children's outcomes. The first, called the "resources" channel, states that the development of children depends on the resources and time that families spend on them (Becker, 1981). An increase in income would allow families to buy more goods and services (food, education, health, books, or educational toys) and directly promote the development of children. The second, called the "family process" channel, stipulates that lower income generates parental stress and relationship difficulties and therefore diminishes the well-being of children (Duncan and Brooks-Gun, 1997). Thus, income transfers may have an indirect effect by reducing stress and improving family relationships and emotional well-being, which would be beneficial for the development of children.

The major challenge faced by researchers attempting to estimate the causal effect of income on children's outcomes is the endogeneity of income. Indeed, evidence shows a strong positive correlation between income and children's outcomes. Canadian studies show that children from affluent families have better cognitive, behavioral, and emotional outcomes than children from poor families (Dooley et al., 2007). In order for income transfers to be effective, this relationship between income and children's outcomes must be causal. Indeed, unobserved characteristics, such as the health and skills of parents, may be correlated with both income and child outcomes and thus lead to biased results.

Blau (1999) and Mayer (1997) are the first to take into account this endogeneity and show that income has a significant effect on several children's outcomes but that this effect is small. These findings were also observed with Canadian data (Dooley and Stewart 2004, 2007). In recent years, the use of instrumental variables has established more convincing effects on the estimation of the causal relationship between income and children's outcomes. For example, Milligan and Stabile (2011) use exogenous changes in Canadian child benefits (federal and provincial) across provinces, time, and family type, to estimate the effect of income on child and family well-being. They show that child benefit programs have significant positive effects on test scores, maternal health, and the mental and physical health of children. We extend the research of the causal effect of income on family outcomes in three ways.

First, we focus our research on the Canadian province of Quebec. Indeed, Quebec's family policy is in stark contrast to that of other Canadian provinces, particularly with

1. These figures include the Canadian Child Tax Benefit (CCTB), the National Child Benefit Supplement (NCBS), the child tax credit, and the Universal Child Benefit Child Benefit (UCCB). These benefits are described in Section 3.

regard to child benefits. For example, in 2009-2010, for a two-parent family with two children, the maximum child benefits amounted to 3,249 dollars in Quebec compared to 0-2,200 dollars in the other provinces. Significant differences were also observed in other social programs between Quebec and other Canadian provinces. Since the results of Milligan and Stabile (2011) are generally not significant when Quebec is excluded from their analysis, it seems desirable to pursue the analysis in Quebec to capture adequately the source of their positive effects.

Second, the results of Milligan and Stabile (2011) are based on the period from 1994-2004. However, since 2004, many financial support programs at both the provincial and federal levels (universal benefit for child care, tax benefits, refundable tax credits) came to enhance the income of families. It is therefore interesting to pursue this analysis by including additional years to take account of these new reforms.

Finally, to estimate the effect of income on children's development, we consider child benefits but also tax assistance to families with children. The tax assistance is computed as the difference between the amount of taxes that a family without children pays and the amount of taxes that a family with children (with the same characteristics) pays. The differences in terms of child benefits and tax assistance between parents and non-parents are studied at both the federal and provincial levels. We refer to financial support to families as the amount of refundable tax credits and tax assistance afforded to families. The tax benefit that households with children have is largely ignored in the study of Milligan and Stabile (2011), as they focus only on child benefits (refundable tax credits).

We use an instrumental variables approach, similar to that of Milligan and Stabile (2011), based on the changes in child benefits and tax assistance across time, number of children, and marital status in order to study the causal relationship between income and family outcomes in Quebec. For this, we use two databases : the National Longitudinal on Children and Youth (NLSCY) for the measures of Canadian children's well-being and the Survey of Labour and Income Dynamics (SLID) to construct the instruments.

Our results show that financial support (child benefits and tax assistance) to families has a positive effect on their well-being. These positive effects relate both to the education of children (less likely to repeat a grade and have a learning disability), behavior and mental health (reduction of hyperactivity, physical and indirect aggression), and the physical health of the mother and child (maternal health and less likelihood to experiment hunger). We also find differences in the effects of financial support by the child's sex.

This paper is structured as follows. Section 2 reviews evidence from prior research. Section 3 reviews the policy environment on child benefits and tax assistance. Sections 4 and 5 respectively present the data set and our identification strategy. Section 6 presents our results, and Section 7 concludes.

2 Previous Research

There is extensive literature on the relationship between income and children's outcomes. The major challenge faced by researchers is how to distinguish the effect of income from the effect of other factors that may be correlated with income. Some characteristics such as parental education or marital status are observable and do not cause any particular problems. Indeed, although they are correlated with income and they can influence the development of children regardless of income, they can be controlled. However, variables such as motivation or the innate ability of the individual are unobserved, and failure to include them in the estimation of the relationship between income and child development could bias the results.

Using American data from the National Longitudinal Study of Youth, Blau (1999) and Mayer (1997) are the first to address this endogeneity problem. By using fixed-effects models, Blau (1999) concludes that income has little effect on child development, thus income transfers to poor families are likely to have little impact on child development. Mayer (1997) also uses several estimation strategies and shows that income has little effect on child development. Nevertheless, these small effects can have a significant cumulative impact on children's development. Using Canadian data from the NLSCY and similar methods to those of Blau (1999) and Mayer (1997), Dooley and Stewart (2004, 2007) report that income has a low impact on the cognitive, behavioral, and emotional development of children.

Despite the advances in nonexperimental methodology to address the omitted variable bias, natural experiments and random assignment experiments provide the most promising opportunities to estimate the causal relationship between income and children's outcomes. These studies estimate the impact of income transfer policies on children via an exogenous increase in family income. One of the well-known examples is the Earned Income Tax Credit program (EITC) in the United States. The EITC is a tax credit for low-income families and is essentially targeted at households with dependent children. Dahl and Lochner (2012) use changes in the EITC over time and across different family type as an exogenous source of variation in income to estimate the effect of income on children's reading scores and math. Using instrumental variables, they show that income has a significantly large effect on children's test scores–a $1,000 increase in family income raises math and reading scores by about 6 percent of a standard deviation. Other studies also show that the EITC has a positive effect on college enrollment and completion of a bachelor's degree (Michelmore, 2013) and that it reduces the likelihood of low weight at birth (Hoynes, Miller and Simon, 2015). The EITC also has a positive impact on the mental health and general health status of mothers (Evans et al., 2014).

Regarding Canada, Milligan and Stabile (2011) estimate the effect of changes in child benefits (federal and provincial) on test scores, mental and physical health, and deprivation measures. They exploit the variation in child benefits across province, time, and number of children. Using the first six waves of the NLSCY, they show that child benefit programs had significant positive effects on test scores, decreased aggression

and maternal depression, and reduced hunger. The positive effects of benefits relate mainly to low-education families, and the majority of effects disappear when Quebec is excluded. Milligan and Stabile (2009) exploit the decision by the Manitoba provincial government to end the clawback of social assistance benefits for transfers through the National Child Benefit Supplement. This policy increased the income for families in the receipt of social assistance. Focusing on low-education families, they find improvement in the cognitive, emotional, and behavioral scores of the children with such assistance.

Finally, regarding the mechanisms through which income affects children's outcomes, Yeung, Linver and Brooks-Gunn Linver (2002) , using US data from the Panel Study of Income Dynamics, show that income has a positive effect on children's development through the resources and time invested but also by reducing stress and conflicting relationships. However, their study has many shortcomings in terms of statistical power. Using the same approach as Milligan and Stabile (2011), Jones, Milligan, and Stabile (2015) study the expenditure patterns of families receiving child benefits. Using data from the Survey of Household Spending (SHS) and SLID, they show that income affects children's outcomes through both mechanisms.

3 Policy

In Canada, child benefits and tax assistance are a shared responsibility of federal, provincial, and territorial governments. In this section, we describe the principle components of the system, starting with the federal policies and ending with specific measures in Quebec (for more details, see Jones et al. (2015)).

The principal component of the federal system is the Canada Child Tax Benefit (CCTB). Initiated in 1993, the CCTB is a refundable tax credit paid monthly to eligible families to help them meet the needs of their children aged 0-17 years. The maximum annual benefit is $1,471 for 2015-2016 and is indexed to inflation every year. The CCTB is uniform in all Canadian provinces, with two provincial exceptions[2]. A supplement of $103 per year per child is paid for families with three or more children. When family net income exceeds $44,701, CCTB payments are phased out at a rate of 2% for one-child families and 4% for families with two or more children. The CCTB is payable for a 12-month period running from July to June of the reference year, with the family net income reported in the previous calendar year.

In 1998, the federal government improves the CCTB by adding the National Child Benefit Supplement (NCBS). The NCBS is for low-income families with children aged 0-17 years and is in addition to the CCTB, which itself is for Canadian low- and middle-families with children. The rates for the period of 2015-2016 are $2,279 per year for the first child, $2,016 for the second, and $1,918 for the third. The family net income

2. In Alberta, the CCTB depends on the age of the child. Thus, in 2015-2016, children under 7 years received $1,357 annually, while those aged between 16 and 17 years receive $1,718. Until 1997, the CCTB paid to Quebec residents depended on the number of children in families, with higher benefits when the number of children increased. Our approach takes into account these exceptions.

threshold for the clawback of these benefits in 2015 is $26,021. The clawback rates are 12.2% for one-child families, 23% for two-child families, and 33.3% for families with three or more children. Is is indexed annually for inflation

The Universal Child Care Benefit (UCCB) was introduced in 2006 to provide financial assistance to families with children under 6 years in their choice of childcare. The UCCB is universal and taxable in the hands of the lower-income spouse. The amount is $100 per month per child. Since January 2015, the UCCB was increased to $160 per month for each child under age 6 and extended to children aged 6-17 years at an amount of $60 per month per child.

In 2007, the federal government implemented the Working Income Tax Benefit (WITB), a refundable tax credit for low-income workers that varies by province and family status. In Quebec, for the fiscal year 2014, the maximum benefits ranged from $946 per year for a single parent with children to $2,524 per year for a couple without children. It is completely phased out by $16,756 for a single parent with children and $31,031 for a couple without children.

Also in 2007, a non-refundable tax credit for each child was initiated with the tax relief of up to $338 ($287.45 in Quebec) per child per fiscal year. From fiscal year 2015, this tax credit will be replaced by the enhanced UCCB.

Among the families of Quebec, many changes in child benefits took place in 1997 and 2005. Indeed, until 1997, residents of Quebec were eligible for a family allowance (child under eighteen years), an allowance for young children (child under six years), and an allowance for newborn children. These amounts increased with the number of children in the family and were independent of family income.

In 1997, these benefits were combined into a new family allowance to cover the essential needs of children under 18 of low-income families, taking into account the CCTB. The amounts of the new allowance are determined based on family status and family net income of the previous year. The maximum benefit is $975 per year per child for the first two children and $398 for each additional child. A supplement of $1,300 per year is paid to single parents. These amounts were clawed back starting at incomes of $15,332 for single-parent families and $21,825 for two-parent families. When family net income exceeds $50,000, these minimum benefits were clawed back at a rate of 5%, eventually reaching zero. From 1988 to 2004, there was also a program in Quebec called APPORT for which only families with dependent children were eligible. Benefits are provided monthly, given that the individual had earned at least $100 for a month of the year. The maximum amount is $2,727 for a single parent with 1 child and $3,980 for a two-parent family with two children. However, the benefits rapidly declined and became zero when family income exceeded $15,330 for single-parent families and $21,820 for two-parent families. Given the complexity of the program, less than 50% of eligible individuals participated in the program.

In 2005, the Quebec government implemented a new program called "Soutien aux Enfants" which replaces the following measures : non-refundable tax credit for dependent children, the tax reduction for the family, and the Quebec family allowance.

There is a refundable tax credit, and all Quebec families with children under age 18 are eligible to receive it. The amount of the program varies by income, marital status, and number of children under 18 in the family, and it is indexed according to inflation each year. In 2015, the maximum amount is $2,366 per year for the first child, $1,182 for the second and third children, and $1,774 for the fourth or higher child. An extra $830 is paid to single parents. The minimum amount is $664 for the first child and $613 for the second or higher child. In this case, an extra $331 is paid to single parents.

Finally, the work premium replaces APPORT in 2005. It now targets low- and middle-income workers, with or without children, and is a refundable tax credit. The amounts depend on the income of the worker and spouse, if applicable, and family status. The maximum amount is $557.90 per year for one person, $2,391 for a single parent, and $3,114 for two-parent families with children. The work premium becomes zero when family income exceeds $15,949 for a single person, $34,280 for a single-parent family, and $47,196 for two-parent families with children.

Figure 1 shows the average total refundable benefits and tax assistance[3] among families with children in Quebec from 1993 to 2007. They are divided by maternal education : not having a college or university degree (low education) and having a college or university degree (CEGEP, community college, nursing, university graduates). We also distinguish according to whether the family has one, two, three children, and one child or more. We use SLID and NLSCY data (biennial data). Consistent with Quebec's new family policy in 2005, the refundable benefits have risen sharply this year as tax assistance decreases for all families. We also note that, between 1997 and 2004, for higher-educated families, the amounts of benefits and tax assistance are quite similar. Several studies report that, during this period, middle-income families are the most aggrieved, because they are too "rich" to have child benefits but too "poor" to fully benefit from tax measures (Rose, 2010). The 2005 reform changes this situation with the increase in refundable benefits for these families.

4 Methodology

The relationship between financial support and family outcomes can be described by the following model :

$$Outcome_{ykmi} = \alpha_0 + X_{ykmi}\alpha_1 + FS_{ykmi}\alpha_2 + \eta_{ykmi} \tag{1}$$

where i indexes families and y, k and m index years, numbers of children and, marital status respectively. The variable $Outcome_{ykmi}$ represents child and mother outcomes and the vector X_{ykmi} contains observable family level characteristics. The variable FS measures the financial support (federal and provincial) awarded to Quebec families.

3. We recall that the tax assistance is defined as the difference between the amount of taxes that a family without children pays and the amount of taxes that a family with children having the same characteristics (i.e. where only the presence of children differs) pays (see more details in Section 5).

The estimation of equation (1) raises a serious methodological problem in the sense that families who receive financial support may be different than other households in both observable and unobservables characteristics, strongly biasing estimates by OLS.

To solve this problem, we use a simulated financial support approach to produce a measure of the generosity in financial support independent of family characteristics. Thus, changes in benefits and tax assistance come from the legislative differences across time, number of children, and marital status. The method involves taking a random sample of families from a dataset with detailed income, benefits, and tax data (here SLID data which later detailed), and pushing them through a tax and benefit calculator. The tax and benefit calculator we employ is the CTaCS package, which is described in detail by Milligan (2010) and Milligan and Stabile (2011). We use a three-step procedure to construct our instrument.

First, we simulate the child benefits for which families would be eligible for each combination of years (between 1993 and 2008), number of children (0, 1, 2, or 3 children), and marital status (two-parent families or not). We have 128 possible combinations in total. Thus, for each family, we have an estimate of what their benefit would have been had they lived with each potential combination. Thereafter, we average the simulated benefit amounts at the year-number of children-marital status level.

Second, we perform the same procedure for tax assistance. We use a random sample of families and include it in the CTaCS tax benefit calculator. We simulate the amounts of the total taxes that these families would pay for each combination of years, number of children, and marital status. We average the simulated tax amounts for each of these combinations. Then we compute the differences between the amount of tax paid by a family without children and families with children for each combination. We then obtain the simulated tax assistance for each combination.

Finally, we build our final instrument, called simulated financial support, which is the sum of the simulated benefits and tax assistance. We use the simulated financial support cells as instruments for the actual benefit and tax assistance amount of each family, given their true year, number of children and status marital characteristics. The actual financial support amount is the sum of child benefits and tax assistance for households with children compared to that provided if they had no children.

The first-stage equation is :

$$FS_{ykmi} = \beta_0 + X_{ykmi}\beta_1 + SIMFS_{ykmi}\beta_2 + \varepsilon_{ykmi} \tag{2}$$

where we regress the true financial support amount FS on the simulated financial support amount $SIMSF$, covariates X, as well as year dummies, number of children dummies and their interactions.

We use the predicted financial support values from our first-stage in the second-stage using family outcomes :

$$Outcome_{ykmi} = \alpha_0 + X_{ykmi}\alpha_1 + \widehat{FS_{ykmi}}\alpha_2 + \eta_{ykmi} \tag{3}$$

So, our approach exploits changes in income as caused by exogenous differences from

the legislation across time, number of children and marital status.

5 Data

In this study, we use two Statistics Canada survey data sets : National Longitudinal Survey on Children and Youth (NLSCY), and the Survey of Labor and Income Dynamics (SLID).

The NLSCY is a long-term biennial survey designed to measure the development and well-being of Canadian children. The survey started in 1994-1995 (wave 1) and ended in 2008-2009 (wave 8). The content of the survey combines extensive health, physical development, education, and behavior of children and their social environment. Detailed labor market and income information for parents are also available. As in Milligan et al. (2011), we focus on children aged 0-10 years, because the majority of the outcomes of interest are asked on a consistent basis regarding this subset. The studied outcomes are limited to explicit age ranges and are specified in the results tables. We use the cross-sectional weights of Statistics Canada. All outcomes are reported by the person most knowledgeable (almost always the mother).

The educational outcomes are : (1) whether the child repeated a grade in the past two years ; (2) the scaled math score to the test administrated to children in grades two through ten (7-15 years). This is a shorter version of the Canadian Achievement Tests, 2nd edition, and is designed to measure the acquisition of basic academic skills. The scaled score takes into account the child's age ; (3) the scaled Peabody Picture Vocabulary Test (PPVT) score available for children ages 4-6 ; and (4) whether the child has never been diagnosed with a learning disability.

For children's emotional and mental health, we use the following outcomes : (1) hyperactivity-inattention score ; (2) prosocial behavior score ; (3) emotional problems and anxiety score ; (4) physical aggression score and conduct problems ; and (5) indirect aggression score. In the NLSCY, these outcomes are available for children aged 4 to 11 years and are described in the Appendix. We also study the mother's depression score, which concerns her feelings and behavior over the past week

Physical health and nutrition outcomes used are as follows : (1) never experienced hunger due to a lack of money to buy food ; (2) the general health of the child is good/fair/poor ; (3) the current size of the child in meters and centimeters ; (4) the actual weight of the child in kilograms ; (5) if the child has been injured in the last twelve months ; and (6) the mother's health is excellent.

A number of control variables are available using the NLSCY. We use the sex of the child, the age of the child, the mother and father's highest level of education, the age group of the mother and father at the child's birth, a dummy for whether the mother or father was born in Canada or not, the size of the area of residence, marital status, the number of children and years.

The second dataset used is the SLID. This survey provides detailed information on family income, work-related experiences, and their demographic characteristics (edu-

cation, household composition, etc.). Starting in 1993, this survey was annual, and it ended in 2011. We use the cross-sectional survey with the associated weight. The SLID is used for the construction of our instrument. Indeed, the SLID data are more precise and detailed in income, benefits, and paid taxes than the NLSCY. To construct our simulated child benefits and tax assistance instrument, we take a 45 percent random sample of the surveyed families with children in Quebec. We put this sample through the calculator for each year-number of children-status marital status combination, as described in Section 4. Averaging at the year-number of children-status marital level produces the simulated child benefits. We also simulate the tax assistance, that is to say for each year-number of children-marital status combination, and we take the difference between the average total amount of taxes paid by a family without children and taxes paid by a family with children. Afterwards, we add the simulated child benefit with the simulated tax assistance to create our final instrument. We merge the simulated financial support instrument from the SLID into the NLSCY data at the year-number of children-marital status level.

6 Results

This section presents the estimates on the relationship between the amount of family financial support and children and mother's outcomes.

We first begin by presenting the estimates from the first stage regression (Table 1). Columns 1 and 2 show, respectively, the number of observations and estimates of the equation 2 using the NLSCY and SLID for year-number of children-marital status combination. For all samples, there is a strong correlation between the simulated financial support amounts and actual financial support amounts. For example, for low-education sample [4], the model indicates that an extra $1 of simulated financial support is predicted to increase the reported financial support by $1.305. We compare our results with those of Milligan and Stabile (2011) (column 3, NLSCY and SLID) and of Jones, Milligan, and Stabile (2015) (column 4, SHS and SLID). Although there are differences in the methodology, our results are consistent with those observed in these two studies.

We now turn to the results of our analysis of the family outcomes for the full sample (Table 2). For each outcome, the number of observations, the age range, the mean and standard deviation are presented. Column 4 shows the coefficients estimated by OLS. As we would expect, the OLS estimates of financial support on family outcomes are strongly biased, primarily because families with financial support are, by definition, those who are most disadvantaged and therefore have lower cognitive score and more behavior and health problems. This highlights the need for an Instrumental Variables (IV) strategy to analyze the effect of income on family outcomes. Column 5 shows the results of Milligan and Stabile (2011) with all Canadian provinces over 6 waves. As can

4. There are some differences between the educational system of Quebec and Rest of Canada, especially at the end of high school. We tried to be as close as possible to the study of Milligan and Stabile (2011) in order to compare our results.

be seen, the signs have changed direction compared to the OLS estimates.

Column 6 presents our IV estimates for Quebec. Our findings suggest that financial support (child benefits and tax assistance) to families has a positive impact on their well-being. These positive effects benefits relate both to the education of children (less likely to repeat a grade and have a learning disability) that behavior and mental health (decrease of hyperactivity and indirect aggression) and physical health of mothers and children (less likely to experiment hunger because of lack of money and maternal health). For example, the significant coefficient -0.029 suggests that an increase in $1,000 in financial support leads to a 2.9 percentage point decrease in the probability of having repeated a grade. For all continuous outcomes, we have normalized the variables using the mean and standard deviation, so that the coefficients reflect the proportion of a standard deviation resulting from a $1,000 change in benefits. For example, for child behavior, an extra $1,000 of financial support is predicted to reduce the hyperactivity score of 6.8 percent of a standard deviation. Comparing our estimates with those of Milligan and Stabile (2011), we note that the positive effects of financial support on families' well-being are more important in Quebec than in other Canadian provinces and are also headed in the right direction (sign). Finally, column 7 shows the estimates with the same methodology as our base results (col.6), but those that are restricted to a set of control variables. Indeed, since the instrument is constructed with SLID data but both steps are performed with NLSCY data, we restrict the control variables[5], available both in the NLSCY and SLID. We report that the findings are similar, except for the height and weight, for which the child's age is a particularly important control.

We now present the estimates according to maternal education (Table 3). Our estimates are separated according to whether the mother has a college or university degree (college or university graduates) or she does not have one (low education). Columns 3 and 4 show the results of Milligan and Stabile (2011) (MS) with and without Quebec, respectively. The majority of the effects become insignificant when we exclude Quebec. In terms of 16 outcomes, 7 are significant with Quebec, and there are only 3 significant at the 10% level, including 1 wrong sign when excluding Quebec. These results suggest that the majority of positive effects observed in MS come from Quebec.

Column 5 shows our estimates for Quebec, taking into account the child benefits and tax assistance. Our results show that family financial support has a beneficial effect on education and behavior child outcomes as well as on the health and nutrition of child and mother. The size of the effects is higher than the full sample (Table 2). For example, for behavior, an increase of $1,000 financial support was predicted to reduce the indirect aggression score of 9.3 percent of a standard deviation. These results are robust when using a restricted set of control variables (column 6).

Then we separate our results by the sex of the child (columns 7 and 8). For educational outcomes, the positive effects of financial support appear to be concentrated among boys with an increase of the PPVT score of 15 percent of a standard deviation for an in-

5. Covariates used for estimates of the column 7 are : education of the mother and father, age of mother and father, marital status, years, number of children.

crease of $1,000 of financial support and significant coefficient of 3.8 percentage points for the learning disability. For behavior and mental health outcomes, the differences between boys and girls are less clear. On one side, we report an increase in the prosocial behavior score for boys, and on the other, a decrease in the mother's depression for girls. Regarding nutrition and physical health, the effects are more concentrated for boys, with an increase in the number of boys who never experience hunger and improved maternal health.

Finally, we study the effects of financial support on children of college or university graduates. This population is one that is least likely to receive benefits and tax assistance and is therefore less likely to benefit from an increase in income. Despite some positive effects (decrease of repetition, higher math scores, and reduced mother's depression score) in this subsample, they remain relatively scarce compared to the low-education group, and we therefore confirm our conclusions.

7 Conclusion

To summarize, the aim of this paper is to study the effect of financial support (child benefits and tax assistance for families) on the education, behavior, and physical/mental health of children and mothers in Quebec. Our approach relies on exogenous changes in child benefit and tax assistance across time, number of children, and marital status. Our findings show that the financial support for families has a positive impact on their well-being. Indeed, an increase in financial support decreases the probability for the child to repeat a grade and have a learning disability and reduces hyperactivity, physical aggression and indirect aggression, and hunger. Furthermore, the mother's health is improved. These effects are particularly important for low-education families. Our results also show different effects depending on the sex of the child. Regarding education and physical health measures, the effects are greater for boys, whereas for behavior, gender differences are less clear. All of these results are consistent with those of Milligan and Stabile (2011) and show that the majority of their effects are driven by Quebec.

It would be interesting in future research to study the mechanisms by which these financial supports have a positive impact on family well-being in Quebec.

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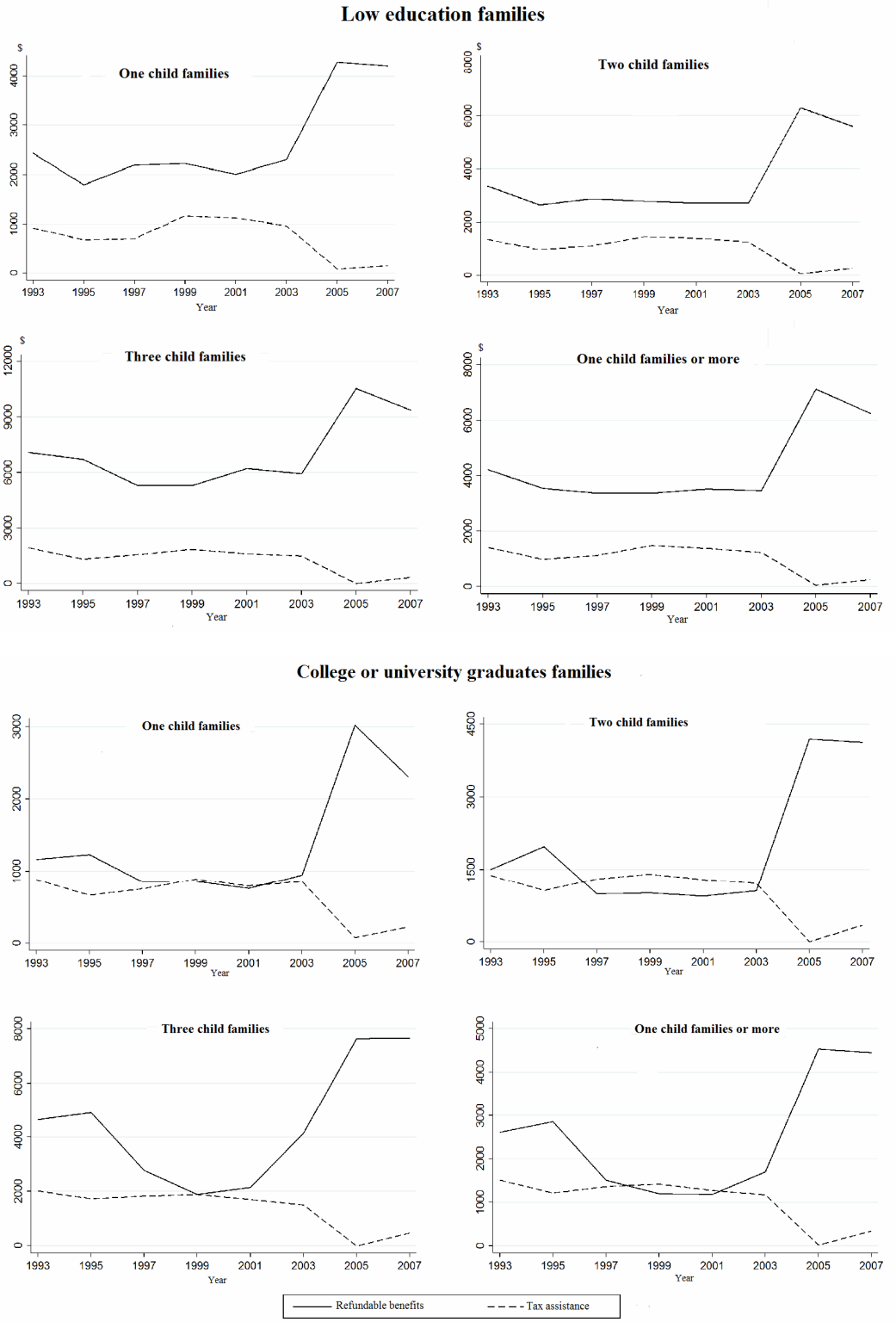
FIGURE 1 – Refundable tax credits and tax assistance in Quebec, 1993-2007



Note: These graphs show the total refundable benefits and tax assistance in Quebec by maternal education. They are divised according to the number of children in the family. Sources: NLSCY and SLID.

TABLE 1 – First-stage results

	(1)	(2)	(3)	(4)
Sample	N		MS(2011)	JMS (2015)
Full sample	22,995	1.371***	0.484***	0.975***
		(0.084)	(0.033)	(0.112)
Low education sample	17,795	1.305***	0.559***	1.347***
		(0.095)	(0.079)	(0.099)

Notes : This table shows the first-stage results (equation 2, column 2). The NLSCY is used for regressions, and the instruments are simulated from SLID. Columns 3 and 4 show results with NLSCY/SLID (Milligan and Stabile, 2011) and SHS/SLID (Jones, Milligan and Stabile, 2015), respectively.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 2 – Results for full sample

Variables	(1) N	(2) Age range	(3) Mean (s.d)	(4) OLS	(5) IV MS (2011)	(6) IV	(7) IV Restricted Xs
Child has ever repeated a grade	7,324	4-10	0.052 (0.222)	0,002 (0.002)	0.027*** (0.003)	-0.029*** (0.011)	-0.028** (0.012)
Scaled math score	3,534	6-10	388,418 (73.183)	-0,008 (0.008)	0.038 (0.037)	0.032 (0.038)	0.053 (0.047)
Scaled PPVT score	6,102	4-6	99.248 (15.627)	-0.017** (0.008)	0.017 (0.021)	0.039 (0.045)	0.016 (0.043)
Not been diagnosed with a learning disability	6,634	6-10	0.963 (0.190)	-0.000 (0.001)	0.004 (0.005)	0.018** (0.009)	0.018* (0.009)
Hyperactivity-inattention score	12,269	4-10	4.630 (3.474)	0.013** (0.006)	-0.068*** (0.015)	-0.068** (0.033)	-0.071** (0.034)
Prosocial behavior score	8,919	4-10	12.671 (3.977)	0.004 (0.006)	-0.087 (0.057)	0.044 (0.035)	0.043 (0.037)
Emotional disorder-anxiety score	12,319	4-10	2.631 (2.404)	0.017*** (0.006)	-0.096*** (0.023)	-0.037 (0.032)	-0.048 (0.032)
Conduct disorder-physical aggression score	12,304	4-10	1.382 (1.931)	0.021*** (0.006)	-0.100*** (0.032)	-0.036 (0.028)	-0.028 (0.028)
Indirect aggression score	11,656	4-10	1.027 (1.603)	0.008 (0.008)	-0.030 (0.026)	-0.076** (0.036)	-0.095*** (0.036)
Mother's depression score	20,458	0-10	4.393 (5.210)	0.026*** (0.005)	-0.101*** (0.016)	-0.031 (0.031)	-0.033 (0.031)
Never experienced hunger because of lack money to buy food	17,165	2-10	0.987 (0.111)	-0.002*** (0.001)	-0.002 (0.003)	0.013*** (0.005)	0.013*** (0.004)
In general, child is in good/fair/ poor health	22,750	0-10	0.130 (0.337)	0.006*** (0.001)	0.005 (0.003)	-0.004 (0.009)	-0.005 (0.009)
Current height in meters and centimeters	18,217	0-10	1.071 (0.242)	0.002 (0.002)	-0.010 (0.007)	0.008 (0.015)	-0.069** (0.028)
Current weight of child in kilograms	21,156	0-10	20.557 (9.466)	-0.004* (0.002)	-0.016 (0.008)	-0.019 (0.015)	-0.096*** (0.026)
Injured in last 12 months	22 733	0-10	0.085 (0.278)	0.001 (0.001)	0.009* (0.004)	0.006 (0.006)	0.004 (0.005)
Mother health status is excellent	22,763	0-10	0.374 (0.484)	-0.008*** (0.002)	0.011 (0.009)	0.022* (0.012)	0.022* (0.012)

Notes : This table shows the number of observations, age range, mean, and standard deviation for each outcome in the first three columns. Column 4 shows our estimates by OLS. Column 5 reports the results of Milligan and Stabile (2011) for all Canadian provinces of Cycle 1 (1994-95) in Cycle 6 (2004-05). Column 6 shows our IV estimates for Quebec and 8 cycles of the NLSCY. Regressions include the full set of control variables. The final column reports the results using the restricted set of control variables with the same methodology than (6).
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE 3 – Results by maternal education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				Low education					College or University		
				Both sexes			Boys	Girls	graduates		
Variables	N	Mean	IV	IV MS (2011)	IV	IV	IV	IV	N	Mean	IV
		(s.d)	MS (2011)	without Quebec		Restricted Xs				(s.d)	
Child has ever repeated	5,820	0,058	-0.016	-0.067	-0.026*	-0.024	-0.029	-0.021	1,481	0,027	-0.046**
a grade		(0,234)	(0.009)	(0.072)	(0.014)	(0.015)	(0.024)	(0.013)		(0,161)	(0.018)
Scaled math score	2,760	386.738	0.069***	0.221	-0,022	0.003	-0,016	-0.041	762	395.231	0.266***
		(72.146)	(0.015)	(0.128)	(0.038)	(0.049)	(0.048)	(0.059)		(77.040)	(0.102)
Scaled PPVT score	4 753	97.856	0.149	9.334	0,027	0.015	0.150*	-0.090	1,330	103.940	0.047
		(15.447)	(0.131)	(34.063)	(0.061)	(0.061)	(0.081)	(0.082)		(15.349)	(0.050)
Not been diagnosed with	5 333	0,963	0.028**	-0.116*	0.020*	0.021*	0.038*	0.003	1 274	0,960	0.020
a learning disability		(0,188)	(0.011)	(0.050)	(0.011)	(0.012)	(0.021)	(0.008)		(0,197)	(0.018)
Hyperactivity-inattention	9,671	4.803	-0.110	-1.283	-0.097**	-0.098**	-0,093	-0.082	2,549	3.947	-0.013
score		(3.547)	(0.090)	(0.771)	(0.048)	(0.050)	(0.077)	(0.055)		(3.081)	(0.033)
Prosocial behaIVor	7 250	12.578	-0.171	5.258	0.039	0.041	0.116*	-0.034	1 646	13.060	0.045
score		(3.974)	(0.113)	(10.517)	(0.044)	(0.047)	(0.065)	(0.054)		(3.975)	(0.059)
Emotional disorder-	9,713	2.670	-0.025	-0.217	-0.064	-0.065	-0,066	-0.063	2,556	2.483	0.015
anxiety score		(2.434)	(0.031)	(0.232)	(0.046)	(0.047)	(0.062)	(0.065)		(2.280)	(0.037)
Conduct disorder-physical	9 706	1.402	-0.106*	-0.337	-0.069*	-0.065	-0,083	-0.049	2,549	1.295	0.034
aggression score		(1.967)	(0.053)	(0.324)	(0.038)	(0.040)	(0.061)	(0.044)		(1.788)	(0.038)
Indirect aggression	9,211	1.043	-0.153***	-0.584*	-0.093*	-0.103**	-0,091	-0.079	2,401	0.968	-0.024
score		(1.619)	(0.040)	(0.222)	(0.050)	(0.052)	(0.067)	(0.072)		(1.543)	(0.042)
Mother's depression	15,950	4.695	-0.196***	-0.229*	-0.009	-0.013	0,078	-0.107*	4,508	3.352	-0.087*
score		(5.393)	(0.060)	(0.107)	(0.038)	(0.038)	(0.053)	(0.056)		(4.363)	(0.049)
Never experienced hunger because	13,383	0,984	0.014**	0.000	0.016**	0.016***	0.016**	0.016*	3 711	0,998	0.005
of lack money to buy food		(0,124)	(0.005)	(0.020)	(0.006)	(0.006)	(0.008)	(0.009)		(0,047)	(0.005)
In general, child is in good/fair/	17,577	0,141	0.018	-0.020	0.003	0.001	-0,013	0.021	5 090	0,093	-0.013
poor health		(0,348)	(0.011)	(0.024)	(0.011)	(0.011)	(0.016)	(0.016)		(0,291)	(0.013)
Current height in meters	14 185	1.078	0.043*	0.141	0.007	-0.038	0,029	-0.013	3 983	1.050	0.009
and centimeters		(0.242)	(0.023)	(0.135)	(0.019)	(0.035)	(0.025)	(0.028)		(0.239)	(0.018)
Current weight of child	16,312	20.941	-0.039	0.006	-0.019	-0.069*	-0,034	-0.012	4,775	19.323	-0.022
in kilograms		(9.547)	(0.037)	(0.050)	(0.021)	(0.036)	(0.030)	(0.029)		(9.102)	(0.020)
Injured in last 12 months	17 564	0,084	-0.002	-0.024	0.004	0.004	0,003	0.007	5 086	0,087	0.010
		(0,278)	(0.011)	(0.064)	(0.007)	(0.007)	(0.011)	(0.009)		(0,282)	(0.010)
Mother health status is	17,604	0,346	-0.001	-0.083	0.033**	0.034**	0.037*	0.030	5,076	0,471	-0.018
excellent		(0,476)	(0.010)	(0.047)	(0.015)	(0.015)	(0.021)	(0.019)		(0,499)	(0.019)

Notes : This table shows the results by maternal education including low-education mothers (columns 1-8) and college or university graduates (columns 9-11). For the low-education sample, the estimates are also divided by the sex of the child. Columns 3 and 4 show the results of Milligan and Stabile (2011), with and without Quebec, respectively.
*** : significant at 1% ; ** : significant at 5% ; * : significant at 10%

TABLE A.1 – Family outcomes (Appendix)

Child outcomes	Questions : How often would you say that child : 1 Never or not true ; 2 Sometimes or somewhat true ; 3 Often or very true
Hyperactivity-Innatention Score (Range : 0-16)	a) Can't sit still, is restless or hyperactive ? b) Is distractible, has trouble sticking to any activity ? c) Fidgets ? d) Can't concentrate, can't pay attention for long ? e) Is impulsive, acts without thinking ? f) Has difficulty awaiting turn in games or groups ? g) Cannot settle to anything for more than a few moments ? h) Is inattentive ?
Emotional Disorder-Anxiety Score (Range : 0-16)	a) Seems to be unhappy, sad or depressed ? b) Is not as happy as other children ? c) Is worried ? d) Cries a lot ? e) Appears miserable, unhappy, tearful, or distressed ? f) Is nervous, highstrung or tense ? g) Is too fearful or anxious ? h) Has trouble enjoying him/herself ?
Physical Agression Score (Range : 0-12)	a) Gets into many fights ? b) When another child accidentally hurts him/her, assumes that the other child meant to do it, and then reacts with anger and fighting c) Physically attacks people ? d) Threatens people ? e) Is cruel, bullies or is mean to others ? f) Kicks, bites, hits other children ?
Indirect Agression Score (Range : 0-10)	a) When mad at someone, tries to get others to dislike that person b) When mad at someone, becomes friends with another as revenge ? c) When mad at someone, says bad things behind the other's back ? d) When mad at someone, says to others : let's not be with him/her ? e) When mad at someone, tells the other one's secrets to a third person ?
Prosocial Behaviour Score (Range : 0-20)	a) Shows sympathy to someone who has made a mistake ? b) Will try to help someone who has been hurt ? c) Volunteers to help clear up a mess someone else has made ? d) If there is a quarrel or dispute, will try to stop it ? e) Offers to help other children (friend, brother or sister) who are having difficulty with a task ? f) Comforts a child (friend, brother, or sister) who is crying or upset ? g) Spontaneously helps to pick up objects with another child has dropped (e,g pencils,books,,,) h) Will invite bystanders to join in a game ? i) Helps other children (friends, brother, or sister) who are feeling sick ? j) Takes the opportunity to praise the work of less able children ?
Mother outcome	Questions : How often you have felt or behaved this way during the past week : 1 Rarely or none of the time (less than 1 day) ; 2 Some or a little of the time (1-2 days) 3 Occasionally or a moderate amount of time (3-4 days) ; 4 Most or all of the time (5-7 days)
Depression Score (Range : 0-36)	a) I did not feel like eating ; my appetite was poor b) I felt that I could not shake off the blues even with help from my family or friend c) I had trouble keeping my mind on what I was doing d) I felt depressed e) I felt that everything I did was an effort f) I felt hopeful about the future g) My sleep was restless h) I was happy i) I felt lonely j) I enjoyed life k) I had crying spells l) I felt that people disliked me

MESURES DE S&BE DES ENFANTS

Mesures	**Questions**	**Réponses possibles**
Child Health (Range: 1-5)	Would you say child's health is	Excellent (1) to Poor (5)
Child injury (Range: 0-1)	In the past 12 months was he/she injured?	Yes (1) or No(0)
Asthma (Range: 0-1)	Has he/she had an attack of asthma in the last 12 months?	Yes (1) or No (0)
Nose/throat infections 0-3 years (Range: 1-5)	How often does child have nose or throat infections ?	Almost all the time (1) to Never (5)
Ear infection 0-3 years (Range: 0-1)	Since his birth, has he had an ear infection (otitis)	No (0) or Yes (1)
Motor and Social Development 0-3 years (Range: 0-36)	Fine and gross motor skills (48 questions)	
Hyperactivity-Innatention 2-3 years (Range: 0-14)	How oftern would you say that child: a) Can't sit still, is restless or hyperactive? b) Is distractible, has trouble sticking to any activity? c) fidgets? d) Can't concentrate, can't pay attention for long? e) Is impulsive, acts without thinking? f) cannot settle to anything for more than a few moments? g) is inattentive?	Almost all the time (1) to Almost never (5)
Emotional Disorder-Anxiety 2-3 years (Range: 0-12)	How oftern would you say that child: a) Seems to be unhappy, sad or depressed?	Almost all the time (1) to Almost never (5)

	b) Is not as happy as other children? c) is too fearful or anxious? d) Is worried? e) is nervous, highstrung or tense? f) has trouble enjoying him/herself?	
Physical Agression and Opposition 2-3 years (Range: 0-16)	How oftern would you say that child: a) is defiant? b) Gets into many fights? c) Doesn't change behavior after punishment d) has temper tantrums or hot temper e) has difficulty awaiting turn in games or groups f) reacts with anger and fighting g) has angry moods h) Kicks, bites, hits other children?	Almost all the time (1) to Almost never (5)
Separation anxiety 2-3 years (Range: 0-10)	How oftern would you say that child: a) cries a lot? b) clings to adults or is too dependent? c) Doesn't want to sleep alone? d) constantly seeks help? e) Upset upset when separated from parents?	Almost all the time (1) to Almost never (5)
Hyperactivity-Innatention 4-11 years (Range: 0-16)	How oftern would you say that child: a) Can't sit still, is restless or hyperactive? b) Is distractible, has trouble sticking to any activity? c) Fidgets? d) Can't concentrate, can't pay attention for long? e) Is impulsive, acts without thinking? f) Has difficulty awaiting turn in games or groups? g) Cannot settle to anything for more than a few moments?	Almost all the time (1) to Almost never (5)

	h) Is inattentive?	
Emotional Disorder-Anxiety 4-11 years (Range: 0-16)	How oftern would you say that child: a) Seems to be unhappy, sad or depressed? b) Is not as happy as other children? c) is too fearful or anxious? d) Is worried? e) Cries a lot? f) Appears miserable, unhappy, tearful, or distressed? g) Is nervous, highstrung or tense? h) Has trouble enjoying him/herself?	Almost all the time (1) to Almost never (5)
Physical Agression 4-11 years (Range: 0-12)	How oftern would you say that child: a) Gets into many fights? b) When another child accidentally hurts him/her, assumes that the other child meant to do it, and then reacts with anger and fighting c) Physically attacks people? d) Threatens people? e) Is cruel, bullies or is mean to others? f) Kicks, bites, hits other children?	Almost all the time (1) to Almost never (5)
Indirect Agression 4-11 years (Range: 0-10)	How oftern would you say that child: a) When mad at someone, tries to get others to dislike that person b) When mad at someone, becomes friends with another as revenge? c) When mad at someone, says bad things behind the other's back? d) When mad at someone, says to others: let's not be with him/her? e) When mad at someone, tells the other one's secrets to a third	Almost all the time (1) to Almost never (5)

	person?	
Prosocial behavior 4-11 years (Range: 0-20)	How often would you say that child: a) Shows sympathy to someone who has made a mistake? b) Will try to help someone who has been hurt? c) Volunteers to help clear up a mess someone else has made? d) If there is a quarrel or dispute, will try to stop it ? e) Offers to help other children who are having difficulty with a task? f) Conforts a child who is cryg or upset? g) Spontaneously heps to pick up objects which another child has dropped (eg,pencils, books, etc) h) Will invite bystanders to join in a game? i) Helps other children who are feeling sick? j) Takes the opportunity to praise the work of less able children?	Never or not true (1) to Very true (5)
Child has ever repeated a grade 4-11 years		No(0) to Yes(1)
Scaled math score 7-15 years		
Scaled PPVT score 4-6 years		No(0) to
Not been diagnosed with a learning disability		Yes(1)
Never experienced hunger because of lack money to buy food		No(0) to Yes(1)
Current height in meters and centimeters		
Current weight of child in kilograms		

MESURES DE S&BE DES PARENTS

Mesures	**Questions**	**Réponses possibles**
Mother's health status (1-5)	In general, would you say your/his/her health is:	Excellent (1) to Poor (5)
Father's health status (1-5)	In general, would you say your/his/her health is:	Excellent (1) to Poor (5)
Mother's depression score (0-36)	How often have you felt this way during the past week I did not fell like eating, my appetite was poor? I felt like I could not shake off the blues even with help from family or friend? I had trouble keeping my mind on what I was doing? I felt depressed? I felt that everything I did was an effort? I felt hopeful about the future? My sleep was restless? I was happy? I felt lonely? I enjoyed life? I had crying spells? I felt that people dislike me?	Rarely or none of the time (less than1 day) to most or all of the time (5-7days)
Family Dysfunction Index (0-36)	Planning family activities is difficult because we misunderstand each other. In times of crisis we can turn to each other for support We cannot talk to each other about sadness we feel. Individuals, in the family, are accepted for what they are. We avoid discussing our fears or concerns. We express feelings to each other. There are lots of bad feelings in our family. We feel accepted for what we are.	Strongly agree (1) to Strongly disagree (4)

	Making decisions is a problem for our family. We are able to make decisions about how to solve problems. We don't get along well together. We confide in each other.	
Positive interaction (0-20)	How often do you praise this child, by saying something like 'Good for you!' or 'What a nice thing you did!' or 'That's good going!'? How often do you and this child talk or play with each other, focusing attention on each other for five minutes or more, just for fun? How often do you and this child laugh together? How often do you do something special with this child that he enjoys? How often do you play sports, hobbies or games with this child?	Never (1) to many times each day (5)
Hostile/ineffective parenting (0-25)	How often do you get annoyed with this child for saying or doing something he is not supposed to? Of all the times that you talk to this child about his behaviour, what proportion is praise? Of all the times that you talk to this child about his behaviour, what proportion is disapproval? How often do you get angry when you punish this child? How often do you think that the kind of punishment you give this child depends on your mood? How often do you feel you are having problems managing this child in general? How often do you have to discipline this child repeatedly for the same thing?	Never (1) to many times each day (5)
Consistency parenting (0-20)	When you give this child a command, what proportion of the time do you make sure that he does it? If you tell this child he will get punished if he doesn't stop doing something, and he keeps doing it, how often will you punish him? How often does this child get away with things that you feel should have been punished?	Never (1) to all the time (5)

Aversive parenting (0-20)	How often is this child able to get out of a punishment when he really sets his mind to it? How often when you discipline this child, does he ignore the punishment? How often do you raise your voice, scold or yell at him, when the child breaks the rules? How often do you calmly discuss the problem, when the child breaks the rules? How often do you use physical punishment, when the child breaks the rules? How often do you describe alternative ways of behaving that are acceptable, when the child breaks the rules?	Never (1) to always (5)