



Research Group on Human Capital Working Paper Series

Paid Parental Leave: Leaner Might Be Better

Working Paper No. 19-01

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March 2019



Groupe de recherche sur le
CAPITAL HUMAIN
ESG UQAM

<http://grch.esg.uqam.ca/working-papers-series/?lang=en>

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March 1, 2019

Abstract

This article provides an analysis of the impact of the Québec Parental Insurance Plan (QPIP). Using a quasi-experimental design with survey data, we find that mothers spent on average 10 additional days with their newborn following the implementation of the insurance plan, and that both mothers and fathers received higher benefits. For children, using both survey data and administrative data, we find that the QPIP had limited positive effects on their health, cognitive and behavioural development. Effects are concentrated among families of mothers with a post-secondary education. These results suggest that while paid benefits increased dramatically, the impacts on maternal time investment and child well-being are modest.

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

JEL Classification: J13, J18, J22, J24

*We gratefully acknowledge financial support from the FRQSC. We thank Michael Veall, Raquel Fonseca, Pierre-Carl Michaud, three anonymous referees, as well as the participants at SCSE and CEA conferences. The analysis presented in this paper was conducted at the Quebec Interuniversity Centre for Social Statistics (QICSS) which is part of the Canadian Research Data Centre Network (CRDCN). The services and activities provided by the QICSS are made possible by the financial or in-kind support of the Social Sciences and Humanities Research Council (SSHRC), the Canadian Institutes of Health Research (CIHR), the Canada Foundation for Innovation (CFI), Statistics Canada, the Fonds de recherche du Québec - Société et culture (FRQSC), the Fonds de recherche du Québec - Santé (FRQS) and Quebec universities. The views expressed in this paper are those of the authors, and not necessarily those of the CRDCN or its partners.

1 Introduction

Parental leave policies have evolved significantly over the last decades. From modest to no paid leave post birth in most OECD countries in 1970, we now observe large-scale paid maternity and parental leave programs extending over more than 20 weeks in most OECD countries (OECD, 2017). Between 1970 and 2016, the length of paid leaves have doubled in most countries. Paid leave exceeds three years in Finland, Hungary and the Slovak Republic, and lies between 40 to 60 weeks in many countries, such as Germany, Austria, Sweden, Canada, Poland, Denmark and Norway. At the low end of the distribution are Mexico and the United States with virtually no mandated paid leave across the country. A number of studies, reviewed below, have looked at the impact of parental leave reforms on maternal work and child development. Extending the time a mother can take away from work typically increases the time spent at home post-birth and better ensures job continuity. The impact on children is less clear. It appears to depend on whether it is a new program or the extension of an existing program. In the case of an extension, extensions of a few weeks do not seem to have an effect, while more generous extensions sometimes do.

In this paper, we provide an evaluation of the Québec Parental Insurance Program (QPIP) relative to the Canadian parental leave program. Although the QPIP may seem complex at first, in practice, it mainly extended coverage to reach more mothers, and raised the benefits paid to mothers and fathers on leave during the child’s first year of life. In contrast to the Canadian parental leave program, the objectives of the QPIP were mainly centred around the economy and financial security, and did not explicitly mention the well-being of children.¹ This is not typical. As stated by Robson (2017), objectives of parental leave policies typically include encouraging workforce participation, providing financial security, promoting gender equity, but also supporting the health and well-being of newborns and adopted children by offering them more time to bond with their parents in their first year of life. In the two following sections of the paper we provide a detailed description of the QPIP, and briefly review the literature on parental leave policies.

Our objective is to offer a fairly comprehensive review of the impacts of the QPIP on parents and children. Our paper offers several contributions. First, for fathers, we estimate the overall impact of the reform on income from work and benefits. Second, we also estimate the impact on mothers’ income from work and benefits, as well as mothers’ time investment

¹According to the 2006 annual report of the Conseil de gestion de l’assurance parentale (http://www.cgap.gouv.qc.ca/publications/pdf/CGAP_rag2006.pdf) the goals were (1) ensure earning replacement for parents while on leave, (2) facilitate the adaptation of the economy to reduce labour shortages and meet the expectations of the younger generations, and (3) adapt to an aging society, and favour social development and economic prosperity

using weeks away from work to care for a young child and breastfeeding duration. Third, we 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 behavioural development outcomes as well as health. We study the impact on child health for several reasons. First, Milligan and Stabile (2011) showed that increased financial resources benefits the health of the child. Second, Baker and Milligan (2008) showed that increased parental leave may lead to increased breastfeeding duration which the American Academy of Pediatrics (1997) positively associates with infant health, especially in cases of exclusive breastfeeding for at least 6 months. Finally, Buddelmeyer, Hamermesh, and Wooden (2015) document the increased time stress experienced by parents upon the arrival of a new child and also for several years after when they have to balance work and childcare constraints. In this sense, parental leave may reduce some of the stress experienced by parents which could contribute positively to the child's well-being. This paper is one of the first to evaluate the impact on child development of a parental leave reform that changed the compensation while on leave but did not extend the duration of parental leave.

Our estimation strategy, described in the fourth section of the paper, 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 birth date as the threshold value. All parents of newborns are included irrespective of their eligibility. This allows us to estimate the average effect on the population of Québec parents, and avoids problems of compositional changes due to the differences in eligibility criteria.

Several data sets are used to conduct our analysis. For descriptive purposes, we use the QPIP administrative data and the Employment Insurance Coverage Survey (EICS). To measure the impact on family resources, as well as children's cognitive and behavioural development, we use the National Longitudinal Survey of Children and Youth (NLSCY) and the Survey of Young Canadians (SYC). These data sets cover children from all provinces in Canada, before and after the implementation of the QPIP. Detailed measures concerning their well-being are provided, along with several measures pertaining to parental income from work, benefits and time away from work around birth. To measure the effect on child health, we use the Régie de l'assurance maladie du Québec (RAMQ) administrative medical records. All children in Québec are covered by the provincial health plan. This data set contains the entire medical history from birth to age 7 years old for a large random sample of children born a few months before and after the reform. It allows us to assess the effect on physicians' healthcare costs, and the incidence and frequency of certain diseases. Our data sets are described in the fifth section of the paper. For clarity, Table 1 specifies which data

set is used to construct each of the Figures and Tables of this paper.

The analysis and findings are described in the two remaining sections. We find that the program raised parental take-up rate and benefits, but otherwise had limited positive impacts on time away from work or child development and health. The equity of the QPIP relative to the federal program is ambiguous. On the positive side, the take-up rate increased, such that more mothers are now covered. However, 21% of mothers still do not have access to the program. Also, our results suggest that the program mainly benefited families of mothers with a post-secondary education by substantially raising their compensation while on leave. It is not clear that raising their compensation had any significant benefits for the economy since their time away from work remained fairly stable, or for their children, since their overall development was only marginally impacted. Clearly, it contributed to their financial security, but these were families that were on average relatively better off to start with.

2 The Québec Parental Insurance Plan (QPIP)

The QPIP was implemented on 1 January 2006. Discussions about a Québec-specific plan had been ongoing in the province for over a decade, long before the Canadian federal plan was extended in 2001. On 1 March 2005, Québec and the Canadian government reached an agreement allowing the province to create its own insurance plan. Finally, on 15 June 2005 the plan was approved at the provincial level. Prior to 1 January 2006, eligible parents in Québec could claim unemployment insurance through the Canadian federal employment insurance program while on parental leave. To be eligible, parents had to work at least 600 hours of insurable employment wages. The federal program offered 15 weeks of maternity leave and 35 weeks of parental leave that could be shared by both parents. The benefit rate in 2006 was set at 55 percent with maximum insurable earnings of \$39,000. Columns 1 and 2 of Table 2 summarizes the federal plan.

As of 1 January 2006, parents residing in Québec became covered by the QPIP. The program details are summarized in columns 3 to 6 of Table 2. Eligibility was lowered at \$2000 of earnings, which represents 200 hours at \$10 per hour. Self-employed parents were also automatically included in the program. Using the NLSCY, we find that there were less than 6% of mothers that were self-employed once the QPIP was introduced. The QPIP was therefore accessible to a larger fraction of mothers than the federal program. Prior to QPIP, the share of mothers who failed to qualify for maternity or parental benefits in Quebec was similar to the rest of Canada (RofC), and following the QPIP, it had fallen to about half of the RofC rate (Robson 2017).

In terms of leave duration and benefit rate, the QPIP offers two options. Option 1

offers 18 weeks of maternity leave and 32 weeks of parental leave. The benefit 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 55 percent. 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 benefit rate compared to the federal plan, but it also raised the maximum insurable earning by 46 percent up to \$57,000 in 2006. As a result, all parents in Québec received higher compensation while on leave, more so if their insurable earnings was above the federal threshold of \$39,000.²

To get a descriptive sense of the potential compensation mothers were entitled to depending on their insurable earnings, Figure 1 plots the maximum total compensation over the leave period by weekly insurable earnings for both the federal plan and the QPIP (reference year 2006). We calculate the average compensation for mothers taking the short and long option over 40 and 50 weeks, respectively. In reality, mothers choosing the short option may take less than 40 weeks and mothers choosing the long option may take less than 50 weeks (but not less than 40). We estimate the response of mothers in the empirical section below. Figure 1 shows that total compensation under the QPIP is almost identical whether the mother takes the long or the short option. Total compensation under the federal plan is however lower if a mother chooses 40 weeks instead of 50 weeks. As a result, the gain from the QPIP compared to the Federal plan over 40 weeks is larger than over 50 weeks. Figure 1 also shows that the gain increases sharply above \$750 (the Federal maximum weekly insurable earnings in 2006). This is because the QPIP maximum insurable earnings is largely above that of the Federal plan at \$1,096 per week in 2006. Above \$1,100, the gain from the QPIP compared to the Federal plan becomes flat at \$16,380 for the short plan (40 weeks) and \$13,625 for the long plan (50 weeks). Clearly this program reached a larger fraction of mothers and raised the disposable income of parents while on leave, especially for parents having higher earnings.

The impact of the QPIP on parental time investment is however not obvious at first sight. Option 1 offers a total of 50 weeks of maternity and parental leave, exactly the same as the federal plan. Option 2 however offers 40 weeks of maternity and parental leave, 10 weeks less than the federal plan. As seen above, the total financial compensation of both options are very similar. Some parents may have selected the short option and returned to work earlier to increase their disposable income. The response of mothers likely varies by earning levels. It is possible that the introduction of the QPIP reduced parental time investment

²The level of insurable earnings is adjusted annually for the QPIP since its creation. Insurable earnings remained unchanged between 1996 and 2006 with the federal program, and then adjusted annually.

for parents that were eligible under both plans. At the same time, since a larger fraction of mothers are covered under the QPIP, parental time investment increased for those that were previously not covered. The empirical section below addresses this question, but we first present descriptive statistics on the choices parents made.

The QPIP administrative data set contains aggregate yearly statistics on the number of recipients under each option by average weekly insurable earnings and birth month. The administrative QPIP records show that about 21 percent of all mothers chose the short option, and this number is very stable over the period. Using the administrative record we find that a larger fraction of low-earnings mothers chose the short option compared to high-earnings mothers. More specifically, Figure 2 shows that about 35 percent of mothers earning less than \$300 per week chose the short option compared to 15 percent for mothers earning more than \$900 per week. To understand whether the compensation scheme of the parental leave program created an incentive for mothers to choose the short option, we need data prior to the reform.

Using the Employment Insurance Coverage Survey (EICS), we computed a number of descriptive statistics between 2002 and 2016. Table 3 shows that the number of weeks claimed by mothers does vary by income category, in both Québec and the rest of Canada. Mothers in the 90th percentile generally took the full 50 weeks in both Québec and the rest of Canada, while mothers in the 75th percentile took around 41 weeks, those in the 50th percentile took around 30 weeks and finally those in the 25th percentile took around 15 weeks. These figures are pretty stable over time and do not appear to be influenced by the QPIP. When we look at weekly benefits over time, mothers in the 75th and 90th percentile in Québec see their benefits increase relative to mothers in the RofC. Benefits of mothers in lower income categories remain at similar levels before and after the QPIP.

From these descriptive statistics, it appears that the QPIP mainly changed the benefits paid to higher income mothers, but had limited impact on time spent at home by parents. We also find that in both Québec and the rest of Canada, low-income mothers returned to work earlier than mothers at the upper end of the income distribution. This suggests that parental leave compensation may not be sufficient to support all of the family expenditures at the lower end of the income distribution.

Finally, the QPIP also included a specific leave period for fathers. 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. To get a sense of the evolution over time and relative to the RofC, we use the EICS. Table 4 shows that the percentage of fathers taking time off from work to care for a child increased in Québec following the reform from 24 percent in 2005 to 65 percent in 2007 and

75 percent in 2013. These statistics are below the official statistics computed by the QPIP, but the trends are similar.³ In the RofC, the percentage increased from 9 percent in 2005 to 11 percent in 2013. This table also shows that between 2006 and 2016, fathers taking a leave in the RofC took an average of 14 weeks while fathers in Québec took 7 weeks.⁴ Together, these statistics suggest that a greater share of fathers in Québec take a leave but when they do so they take fewer weeks.⁵ Although the Québec paternity leave is short, 3 to 5 weeks, it may have positive impacts. Cools, Fiva, and Kirkebøen (2015) find that the introduction of a similarly short (4 weeks) paternity leave in Norway in 1993 raised the percentage of fathers on leave and had a positive impact on the school performance of some children.

Overall, the QPIP increased compensation to all families while parents were on leave, but the compensation of high-earning mothers increased more proportionally. First, the maximum insurable earnings was increased. Second, high-earning mothers more often selected the long option compared to low-earning mothers. The QPIP also appears to have increased the participation 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. In the empirical section, we formally estimate 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.

3 Parental Leave Reforms – What is the Evidence?

One of the major challenges faced by researchers estimating the causal effect of parental time investment and/or financial resources on child development is the endogeneity of parental decisions and financial resources. Children whose parents spend more time with them are likely to have a more favourable family and home environment including better educated parents,⁶ which contributes to their development beyond their parents' time investment. As a result, a growing body of research uses parental leave reforms to estimate the impact of parental time away from work (induced by the reform) on children's outcomes. 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 on family disposable income. This

³The QPIP statistics are based on birth year while the EICS is based on survey year for fathers of a child aged 0 to 12 months old.

⁴These statistics are in line with those of Marshall (2008).

⁵If all fathers, including those that take zero weeks, are included, time on leave increased by 3 weeks on average in Québec following the QPIP (Patnaik, 2017).

⁶See Guryan et al. (2008).

effect depends on the compensation received while on leave compared to the after-tax and after-childcare-deduction income (e.g. Baker and Milligan, 2010). To understand the impact of parental leave on children, it is essential to first document the effect on both parental time investment (duration and timing after birth) and monetary resources while on leave. 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).

Research exploiting large changes in parental leave entitlements of a few months generally find positive to null effects on child development, with larger effects on specific subgroups of children. In Norway, 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). Cools, Fiva, and Kirkebøen (2015, Norway), Danzer and Lavy (2013, Austria), and Liu and Skans (2010, Sweden) 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. Baker and Milligan (2010, 2015) find that the Canadian parental leave reform of 2001, which increased parental leave benefits by 25 weeks, had no impact on child development. More modest reforms of 6 weeks or less generally lead to no significant effects (e.g., Dahl et al. 2016, Norway; Rasmussen 2010, Denmark). But modest parental leave provisions in the first few months of life generally reduce infant mortality (Rossin 2011, USA; Tanaka 2005, OECD countries). They also have long lasting effects, with reduced incidence of ADHD and hearing-related problems for elementary school children, especially for children of less advantaged mothers (Lichtman-Sadot and Bell 2017, California). Assessment of the recent introduction of the Australian program (Martin et al. 2014) also finds that breastfeeding increased and children were less likely to visit a physician. Finally, Rhum (2000, 16 European countries) finds that longer leaves have stronger effects on postneonatal or child fatalities than for perinatal mortality, neonatal deaths, or low birth weight.

Reforms studied in the literature extended both the duration of paid leave and financial compensation while on leave. In so doing, they extended the time a parent can stay at home with his or her child while receiving monetary compensation. The reform studied in this paper increased the monetary benefits paid to parents while on leave, and extended time spent at home only for those that were previously not entitled to paid leave under the federal program. While the effect of the reform on those that were previously not covered related to the literature cited above, the effect on those that saw their benefits increase probably relates more closely to the literature on the impact of financial resources on child

outcomes. In Canada, for example, Milligan and Stabile (2011) show that the expansion of the Canadian Child Benefit resulted in improved health and test scores for children as well as better maternal health. They also find gender specific effects, with boys showing greater improvements in test score and physical health, and girls showing improved mental health. In our empirical application, we are not able to separate those that were previously not eligible from those that were, mainly because the number of mothers that became eligible post reform is too small to be studied separately. Nonetheless, we keep this dual impact in mind when discussing and interpreting our results.

Finally, the QPIP introduced a paternity leave of 3 or 5 weeks. Boll, Leppin, and Reich (2010) using data on several industrialized countries showed that there is a sizeable positive relationship between high parental leave benefits available to fathers and fathers' time implication in the household. This is especially true for highly educated fathers. However, Ekberg, Eriksson and Friebel (2013), using a quasi-experimental approach, did not find that the Swedish parental leave reform increased the participation of fathers in the household. Patnaik (2017) exploited the QPIP reform and found that fathers in Québec are more actively involved post-reform but observes less than 100 fathers post-reform. Dedicating weeks to fathers may prove to have a larger effect on fathers' involvement than making parental leave accessible to both fathers and mothers.

4 Empirical Strategy

Our econometric approach is based on a difference-in-differences (DID) estimator and a regression discontinuity design (RDD). When using DID, we compare parental and child outcomes of children born in Québec around the reform to those of comparable children born in the RofC. The DID estimating equation is as follows:

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

where by is the birth year of infant i and t is the age of the child when the outcome is measured. $I(by \geq 2006)$ 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 group. It is equal to one if the child was born in Québec 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 ordinary least square (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 (Québec) 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 Québec may have permanent differences when compared with mothers in the RofC and these differences can influence the outcome variables. Since all children born in Québec are included in the treatment group, the impact on newly eligible parents is captured as well as the impact on parents that were eligible under both plans. It also captures the effect of potential changes in birth seasonality (Campton and Lindsay 2016).

Our results could be confounded by other reforms taking place at the same time as the QPIP. In 2006, the federal government introduced a new universal cash transfer program for families with a child younger than 6 years old. The Universal Child Care Benefit (UCCB) program provided \$100 per month to all families regardless of income. This program impacted all families across Canada. Our control group serves to account for changes induced by the UCCB that could also impact Québec families.

The Québec subsidized daycare program was implemented on 1 September 1997. Children aged 4 on 30 September 1997 became eligible to accredited and regulated childcare at the low cost of \$5 per child per day. As of September 2000, all children below 59 months were eligible to the subsidized daycare. Research on the subject suggests that the policy, which resulted in an increased proportion of children in daycare for long hours, had negative effects on the development of young children (e.g. Baker, Gruber and Milligan 2008; Haeck, Lebihan and Merrigan 2018). We therefore exclude children born prior to 2003, because their lives were affected by the highly documented Québec childcare reform. Children born in 2003 entered childcare in 2004. At this time, changes in the number of hours spent in childcare and maternal labour force participation had stabilized (e.g. Haeck, Lefebvre and Merrigan 2015; Beaujot, Jiangqin, and Ravanera 2013).

The DID strategy is used with data from the National Longitudinal Survey of Children and Youth and the Survey of Young Canadians. Using RDD is not an option because we have an insufficient number of children born around the policy cutoff in those data sets. Instead, we use a longer period and use parents and children from the other Canadian provinces as a control group. The data sets are further described in the next section.

When we use the administrative records of the Régie de l'Assurance Maladie du Québec to estimate the impact of the reform on healthcare costs and diagnostics, we use RDD. In this data, we observe 18,000 children from Québec born within three months of the policy change (before or after). The empirical model is as follows:

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

Since we do not specifically identify treated mothers and children, 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 Québec 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.

Irrespective of the approach used, the effects measured in this study only speak to the impact of the QPIP relative to the federal parental leave program in place prior to the introduction of the QPIP. The federal program already provided parents with a total of 50 weeks of parental leave.

We first estimate the effect of the QPIP on parental take-up rate, parental benefits and time spent away from work to show the direct impact of the program on parental labour force participation and financial resources. Since children are directly influenced by parental choices and behaviours, we then estimate the effect of the program on child health and development.

5 Data Sets and Summary Statistics

Our empirical analysis relies on four sources of data (summarized in Table 1): (1) the National Longitudinal Survey of Children and Youth (NLSCY), (2) the Survey of Young Canadians (SYC), (3) the administrative health records of the Régie de l'Assurance Maladie du Québec (RAMQ), and (4) the Live Birth Registry 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. 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. 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 behavioural development outcomes for children ages 2 to 3 years old whose parents were eligible for the QPIP. We also use our combined data set to look at the impact on child health. Effectively, we focus on children born in all family types between 2003 and 2008 inclusively, three years prior to the reform and three years after. As mentioned above, we exclude children born prior to 2003, because their lives were affected by the highly documented Québec childcare reform.

Table 5 shows the summary statistics for our main control variables for children aged

0 to 1 born pre and post reform in Québec and the RofC.⁷ This table shows that children in Québec and the RofC are similar in terms of age at the time of survey and early health outcomes (birthweight, prematurity, neonatal care and breastfeeding status). We observe that the age of the child is lower for children born after the reform (*Post*) in both Québec and the RofC. This is due to the biennial design of the NLSCY. Our empirical strategy accounts for age differences at the time of the interview 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 5 also shows that relative to children in the RofC, children in Québec have fewer siblings. Mothers and fathers in Québec are more likely to have a post-secondary education than mothers and fathers in the RofC. Some of this difference is likely attributable to underlying differences in the educational system in the two regions. In Québec, after high school, students pursue two years of CEGEP (pre-university college) before entering university, while students in the RofC transition directly to university.

Tables 6 and 7 show the summary statistics for our main outcome variables for children aged zero and 1 year old, and children aged 2 and 3 years old, respectively. Table 6 focuses on parental income from work, benefits and maternal time investments (time away from work⁸ and time breastfeeding) when the child is zero or 1 year old. Questions on income from work and parental benefits⁹ always refer to the past 12 months. Table 7 presents the descriptive statistics on child development.

Table 6 shows that mothers typically returned to work when the child was slightly more than 10 months old, in both Québec and the RofC. The difference-in-difference (DID) estimated coefficient suggests that, following the introduction of the QPIP, mothers in Québec spent slightly more time away from work in their child’s first year of life, about 0.32 months or 10 days ($p < 0.01$). 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 aged less than 22 months old when we analyse the impact of the introduction of the QPIP on maternal income from work and parental benefits. From these statistics we can observe that mothers in Québec typically earned a higher income from work¹⁰ than mothers in the RofC. This likely reflects the higher participation rate of Québec mothers in the labour market. Since the DID coefficient without controls is not significant, mothers’

⁷A similar table for children aged 2 to 3 years old is presented in the Appendix in Table A.2.

⁸Time away from work is not available in the NLSCY for the father.

⁹Paid parental leave benefits here refer to the part paid by the government through Employment Insurance.

¹⁰Income 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.

income from work does not appear to be affected by the reform. 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.¹¹ Table 6 shows that, prior to the reform, Québec mothers also had slightly higher parental benefits and that this difference increased post-reform. The DID estimate presented in the last two columns of the table suggest that total annual benefits for Québec mothers increased by \$2,556 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 6 suggest that fathers in Québec earned a higher income from work post-reform and also claimed slightly higher total annual benefits (\$375).

In summary, it appears that the reform mainly increased maternal benefits while on leave, but had little impact on the time mothers spent away from work. Relative to fathers in the RofC, benefits claimed by fathers in Québec increased slightly following the reform.

Statistics on child development are presented in Table 7. For children aged 2 and 3 years old, we have at our disposal one parent-reported measure of cognitive development and four parent-reported measures of behavioural development. The Motor and Social Development (MSD) scale measures early child development and leverages 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 better motor and social development. The behavioural scales measure (1) emotional disorder and anxiety, (2) hyperactivity and inattention, (3) physical aggression and opposition, and (4) separation anxiety. A higher score implies further evidence of behavioural disorder across all four measures. These measures come in part from the Achenbach’s Child Behaviour Checklist (CBCL) and the Ontario Child Health Study (OCHS). Finally, given the potential effect on health, we also estimate

¹¹In practice 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.

the impact on two parent-reported measures of health: a general assessment of the child’s health (excellent (1) to poor (5), five levels), and the frequency at which the child has been in good health in the past few months (almost all the time (1) to almost never (5), five levels). Except for the MSD score, a *lower* score indicates a *better* outcome for children.

In Table 7 we observe that prior to the reform, Québec children had slightly less favourable scores compared to children in the RofC. Following the reform, slight improvements in Québec are visible. In fact, the DID estimates without controls, suggest that most scores seem to improve for children in Québec relative to the scores of children in the RofC. Most of the variations are small but significant.

In these surveys, child health is measured by one of the parents, typically the mother. To validate our results, we also use RAMQ data. This data set contains every physician invoice within the public system. In Québec, practically all physicians (generalists and specialists) practice medicine in the public system. Healthcare is mostly free at the point of use, since the billing and claims to the government for healthcare services 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, or in some cases have to pay the total amount upfront and get reimbursed later through public insurance. In Québec, the RAMQ is the sole public agency authorized by the government to pay for services provided by physicians participating in the system. Every service recorded in the data set includes the following details: intervention date, fee, diagnosis¹² (e.g., pneumonia, otitis), 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 a random sample of 18,000 newborns born three months before the reform and three months after. The administrative data includes every child in Québec. Our sample represents about 40 percent of all children in Québec born during that period. We observe their complete RAMQ health record from birth to age 7 years old. In total we have over 1 million medical acts recorded 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. Using the RAMQ data, we can estimate the impact of the program on child healthcare 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 way. This data set includes all children born in Québec 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 birth weight, gestation length, gender,

¹²Note that for routine exams, no diagnoses are provided.

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 on maternal time investment. These estimates are crucial since they determine the actual treatment for children 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 impacts and that have not yet been studied, such as parental health and well-being, fertility and maternal labour supply over the long run are left for future studies.

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 maternal¹³ time investment is not immediately clear. On one hand it increases paid benefits while on leave, which reduces the opportunity cost of not working and could entice mothers to take more time off work. On the other hand, the QPIP offers a short option (40 weeks versus 50) that basically offers almost the same total paid benefits. This could therefore reduce the time mothers invest in their children post-reform. Clearly, because the amount of insurable earnings was raised, mothers with insurable earnings above the pre-reform threshold saw their net cost of not working decrease proportionally more than mothers below the threshold. Finally, self-employed mothers, previously not covered by the federal plan, are now eligible. They may take more time away from work, but since less than 6 percents of mothers are self-employed, it influences the overall effect only marginally.

Estimates of the impact (β) on parental income from work and benefits are shown in Table 8 while those of the impact on maternal time investment (time away from work and time breastfeeding) are shown in Table 9. Parental income from work and parental benefits are annual figures measured in dollars (reference year 2006). Maternal time investment is measured in months. We show the results for our base model (equation 1) in specification

¹³The NLSCY and the SYC do not provide information on paternal time investment.

(1). Specifications (2) through (4) additionally include a set of control variables specified at the bottom of Tables 8 and 9. 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 (when breastfeeding is not the outcome variable).

Results in Table 8 suggest that a larger fraction of mothers benefited from maternity parental leave. Across Québec, we find that the percentage of mothers taking a leave increased by 6 percentage points. In parallel with this increase, we find that following the reform maternal income from work decreased by as much as \$1,558 while maternal benefits increased by \$2,729. The TOT¹⁴ 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. The decrease in maternal income from work likely reflects the fact that a larger fraction of mothers claimed benefits under the QPIP and therefore took time away from work. These mothers were unlikely to have an employer top-up. Maternal benefits increased for three reasons. First, mothers who were previously not eligible became eligible and claimed benefits. Second, since the maximum insurable earnings was raised, mothers whose insurable earnings were above the federal former threshold gained more benefits. Third, the benefit rate was increased.

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 Québec and Ontario share similar trends. We also restrict our observation period to two years pre- and post-reform (specification 6). While the benefits 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, therefore, that post-reform mothers in Québec received approximately \$2,700 of additional benefits on average and experienced a loss of income from work of no more than \$1,558.

The QPIP also had a component exclusive to 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 post-reform and their income from work remained constant (+\$256 but not statistically different from zero). This is in line with the descriptive results shown in Table 4 using the EICS.

We now turn to Table 9 which focuses on maternal time investment. First, we find that

¹⁴As mentioned in the empirical strategy section above, to recover TOT effects, the estimated impacts need to be multiplied by a factor of 1.25.

mothers returned to work 0.33 months later (10 days¹⁵) post reform. This represents a loss of income of about \$880.¹⁶ While the work behaviour of mothers can explain part of the variation in income from work documented above, it only explains about half of the total amount. The remaining part most likely reflects a reduction in parental benefits paid by employers in response to the increase by the government.

Since mothers spent slightly more time with their infant post-reform, one might wonder if this resulted in a longer breastfeeding period. A fairly large body of literature studies the link between breastfeeding and child health (e.g., American Academy of Pediatrics, 1997). Our results do suggest a modest increase in breastfeeding duration of about 10 days (0.31 month). More importantly, our results suggest a 6 percentage points increase in the probability of breastfeeding past the critical 6 month period. The American Academy of Pediatrics provides a summary of the benefits of breastfeeding for infant health including a reduction in otitis media, asthma, gastroenteritis and respiratory infection. The impact on children's health is investigated in the next section.

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 benefited more from the reform. Following the introduction of the QPIP, highly educated mothers spent an additional 0.62 months (19 days) with their child and claimed an additional \$3,445 in parental leave benefits. They also increased the time they breastfed their child by an additional 0.36 months (11 days). In contrast, all other mothers (Low Educ.), did not spend more time away from work and got \$1,312 in additional benefits. Both groups of mothers earned a lower total annual income post-reform, but low educated mothers experienced a larger decrease at \$2,475. The net effect on financial resources for families is positive for highly educated mothers but negative for all other mothers. Clearly, mothers with a post-secondary education gained the most from this reform. For fathers, we do not observe a significant difference by education level.

In summary, our results suggest that, on average, mothers spent slightly more time away from work (0.33 months, or 10 days), which was mirrored by a comparable increase in breastfeeding duration. These effects appear however to be driven mainly by highly educated mothers. We also find that benefits to fathers increased, and our descriptive results suggest that a larger fraction of fathers took time off from work to care for their child. The overall gains to the families are positive, but modest when the overall loss of income from work is accounted for. Finally, the financial gains appear mainly concentrated among families with

¹⁵The TOT effect would be 13 days.

¹⁶Administrative records from the QPIP shows that the average weekly insurable earnings for benefit recipient mothers was \$616 in 2006.

mothers having a post-secondary education.

6.2 Children’s Well-being

In this section, to estimate the impact of the reform on children’s well-being, we compare the outcomes of children aged 2 to 3 years old in Québec before and after the reform to the outcomes of comparable children in the RofC. Generally, our results presented in Table 10 suggest that the reform had limited positive benefits on young children in Québec. The estimated impact on the MSD score is positive, ranging from 0.97 to 1.83 (or about 0.07 to 0.13 SD). However, this effect is not significant across all specifications. Results by maternal education show that the effect is larger for children of mothers with a college or university degree (High Educ.), but not significant.

We find that the reform appears to have decreased the presence of emotional disorder and anxiety (-0.15 or -0.10 SD) and also slightly decreased the presence of separation anxiety (-0.09 or -0.05 SD). The impact on hyperactivity and inattention is also favourable (-0.10 or -0.04 SD) but not significant. We do not find any persistent and significant effects on physical aggression and opposition, but the sign suggests a reduction of this behavioural problem. We find similar results using Ontario as a control group (specification 5). If we restrict our attention to children born in 2004 to 2007, the results do not hold, except for the MSD score and child health recently. The impact on behavioural development for 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. We find an improvement in behaviours related to separation anxiety and a deterioration in behaviours related to physical aggression and opposition.

Finally, when we look at health outcomes, we find that child health recently appears to have improved (-0.03 or -0.04 SD). The average effect on overall health is null, but children of highly educated mothers seem to be better off on average. They were the ones who benefited the most from increased financial resources, more time with their mother and more breastfeeding time.

How can we interpret these effects? On emotional disorders, if 15 mothers out of 100 changed their answer by one category for one of the 5 questions included on 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 9 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]).

The outcomes we used above were reported by the primary care giver, which in the NLSCY is almost always the mother. To further grasp the importance of the effects we measured on child health, we now use data on healthcare 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 healthcare 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 post-reform 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 Québec and therefore accurately represents the population of newborns in Québec. 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 11 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 post-reform have lower healthcare 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 post-reform children experience winter mainly before turning one year old. When we look at the overall cost before pre- and post-reform children turn 2 years old, we see that the cost difference between the two groups is almost null, at \$6.60. By the time post-reform children reach 7 years old, they have lower healthcare costs, but the difference is small and not significant at -\$14.23.

Children whose parents were on social assistance (*Assisted*) at the time of birth were not eligible for the QPIP. When we focus on children not on social assistance at the time of birth (*Non-assisted*), 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 ($p\text{-value}<0.05$). This may reflect seasonal effects. 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 a non-significant increase in healthcare costs post-reform of the order of $\$138.93$.

Healthcare costs have a skewed distribution. Most children have small healthcare costs over the first seven years of their life and only a few exceptions have relatively high healthcare 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.3), we find similar patterns, but the estimates are slightly more precise and of a smaller magnitude.¹⁷ The DIDx estimates remain significant up to age 3 years old at $\$68.92$ ($p\text{-value}>0.1$). The majority of this effect is already visible at age 1 ($\$54.66$, at ≤ 1 yr). One possible explanation is that during the child's first year of life, parents in Québec do a better job of following the regular check-up calendar recommended by doctors because they have slightly more time. This would result in a slight increase in overall costs without reflecting a worsening of child health. Finally, if we look at frequency of medical conditions common during childhood, such as otitis media or respiratory infection, we do not find any positive or negative effects of the reform (Table A.4).

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 neuroscience 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 months¹⁸ 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

¹⁷We also find that excluding children born 3 to 5 days before and after the reform does not change our results.

¹⁸Note that Bowlby and Ainsworth's models of attachment specify that the process of primary attachment continues past 8 months and overlaps with the ultimate goal for forming multiple attachments as a toddler (near 18 months).

our setting, the impact on maternal time investment is very modest with highly educated mothers spending about 19 days more with their child and all other mothers spending no more additional time. These additional days may lead to small positive impacts on child development.

Second, the literature on breastfeeding duration suggests that increasing breastfeeding at least until the child is six 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 month window (see Table 6). While the gains are statistically significant, they are extremely modest (about 10 additional days) and only positive and significant for highly educated mothers. Overall, the modest impact on breastfeeding appears to translate into marginally better parent-reported health, but does not translate into lower healthcare costs over the child's first seven years of life. Compared to previous studies on parental leave and child health cited above, our results may appear surprising. These studies looked at the impact of changes in parental leave duration in the first few weeks of life on health at the time of birth and during elementary school. In contrast, we study a reform that had a small impact on maternal time investment and a positive impact on disposable income for highly educated mothers 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. In Norway, Cools, Fiva, and Kirkebøen (2015) found that paternity leave does not improve school readiness on average, but may have a positive impact on children of highly educated fathers (0.1 SD on school performance in Norwegian, English and mathematics). While the role of fathers is not yet well understood, early evidence using a quasi-experimental framework suggests that their participation may lead to positive outcomes. We found that, following the QPIP, a larger share of fathers in Québec took time away from work after the birth of their child, but on average, these fathers took fewer weeks than fathers in the RofC taking parental leave. It is possible that some of the modest positive impacts we uncover on child behaviour may be in part due to the higher involvement of fathers post-reform, but more evidence is needed to confirm that channel.

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. Milligan and Stabile (2011) also find positive impact of cash transfers in the Canadian context. 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 appear 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 achieve better health and behavioural 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 investment are extremely modest while the impacts on financial resources are more substantial, at least for maternal benefits for highly educated mothers.

Irrespective of the mechanisms, one might wonder if the benefits are worth the costs. When Québec decided to opt out of the federal parental leave program, an agreement was reached whereby the unemployment insurance premium of Québec residents would be permanently reduced by about 0.34 percent. In turn, to finance its program, the province of Québec implemented a payroll tax of 1.34 percent for salaried employees and 0.99 percent for the self-employed. Benefits paid by the federal program in 2005 amounted to \$722 million (nominal). In 2006, the QPIP paid \$1,176 million to mothers and the administrative cost of the program was \$31 million (see Table A.1).¹⁹ Part of this increase can be attributed to the higher amount of benefits paid to parents, but also to the participation of self-employed parents and the participation of mothers now meeting the lower eligibility criteria.

Prior to the reform, mothers in Québec were already investing a large fraction of their time at home during their child's first year of life (about 10.2 months, Table 6). The additional benefits 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 Québec, recent estimates suggest that it cost around \$0.72 to raise \$1 through income taxation (Québec government, 2015). Finally, we observe that mothers earning higher incomes benefited more from the program both in terms of benefits received and amount of time invested in their children. However, since their salaries are on average higher, they also contribute more to the program. Finally, while the QPIP covers a larger fraction of mothers than the federal program, the program does not cover everyone. There are still around 21% (see Table A.1) of children in Québec whose parents do not benefit from

¹⁹In 2016, the program reached 1,956 million and the administrative cost was 56 million.

parental leave. In a society where equal opportunities for all children should be a priority, we argue that children, irrespective of their family background, should receive equal care from their parents in the first year of life.

8 Conclusion

In this article, we evaluate the impact of the QPIP relative to the pre-existing federal parental leave program which offered a total of 50 weeks of parental leave. Relative to the federal program, the QPIP maintained the number of weeks covered, but lowered the eligibility criteria while raising the maximum insurable earnings and the benefit rate. It also introduced benefits dedicated to the father.

Our empirical results suggest that following the introduction of the QPIP, a larger share of mothers benefited from paid leave after birth. We find that, on average, mothers in Québec (relative to mothers in the RofC) spent an additional 10 days with their child and also increased breastfeeding by about 10 days. Post-reform, mothers and fathers claimed higher benefits. 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, behaviour and cognitive development are generally positive but small and not always significant. These average effects possibly mask important differences between mothers. Results by maternal education reveal that most of the effects we uncover are driven by highly educated mothers and their children. Mothers with a post-secondary education spent an additional 19 days away from work and their children have marginally better parent-reported health and behavioural outcomes.

For fathers, we find that dedicating parental leave to fathers increased the participation of fathers in the program, but it remains to be shown that this translated into a greater involvement of fathers into the child's life over the long run. As pointed out by Tremblay and Genin (2010) dedicating weeks to fathers is a step in the right direction, but it is likely not sufficient. Perception in the workplace also matters for paternity leave policy to achieve its goal.

The QPIP is not generally redistributive in nature. Changes induced by the QPIP largely benefited higher income families who also cover a larger fraction of the cost of the program. Our findings however 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 earnings had limited impact on maternal time investment. Raising additional revenues from income taxation to finance larger benefits for higher income parents appears

counterproductive.

Our findings have important implications for other jurisdictions offering paid parental leave or planning to do so. In Canada, the federal government offers, since 2018, an extended parental leave program over 61 weeks instead of 35 weeks with a benefit rate of 33 percent instead of 55. While 55 percent may have been sufficient to entice mothers (especially high income mothers above the 75th percentile) to take the maximum number of weeks of parental leave, it is not clear that 33 percent will be sufficient to entice mothers to extend their leave period to 61 weeks. Our results suggest that high income mothers take more time off from work. This may suggest that only mothers in the top percentiles of the income distribution will benefit from the recent federal reform. In Québec, mothers have had job-protection for a total of 70 weeks post birth since 1997. Yet we observe few mothers who take more than 50 weeks.

As pointed out by Burton and Phipps (2017), poverty rates after tax and transfers across Canada, and also in Québec, have fallen for lone mothers between 1987 and 2014. But both poverty rates and inequality of income remain higher than in other affluent countries such as Denmark and Norway. Around 21% of parents in Québec and 35% in the RofC do not claim benefits under the QPIP or employment insurance. Providing better support for these parents and their children should be a priority.

Clearly, the QPIP could be redesigned to provide more equal opportunities for families to invest in their children. Coverage should be extended to all families, including an allocation for low-income families. 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 benefits²⁰ of the program, reducing both the QPIP payroll tax and the overall benefits to higher income-families would improve the effectiveness of the program.

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²⁰Other benefits not documented here might include better retention of women in the labour market and increased overall well-being.

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10 Figures

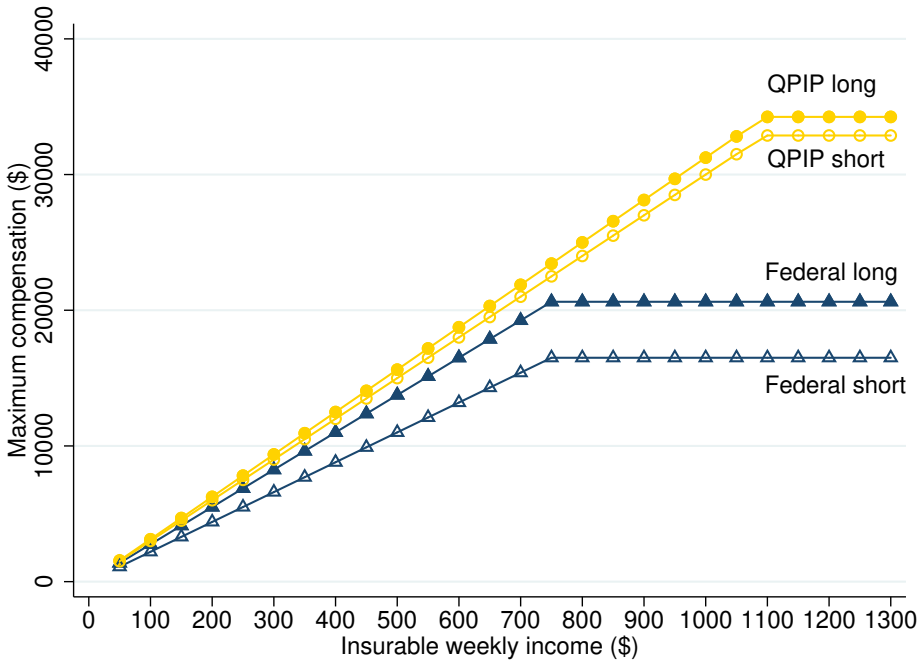


Figure 1: Maximum compensation - Reference year 2006

Source: Authors' calculations using QPIP administrative records for 2005 to 2013, and data from Marshall (2008) for years 2004 and 2005.

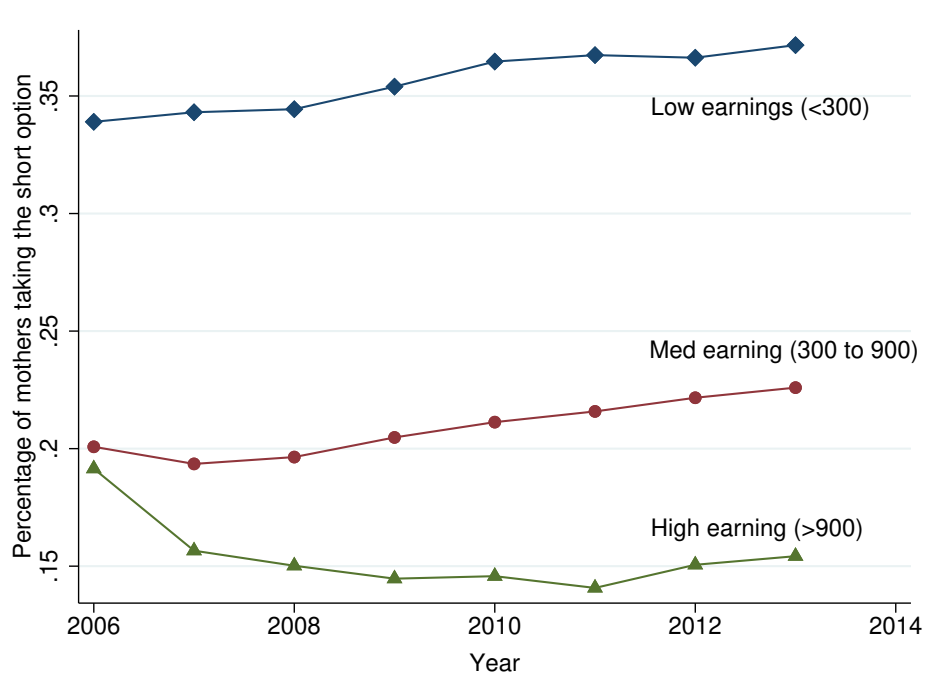


Figure 2: Percentage of mothers taking the short option by insurable weekly earnings category

Note: This figure shows the percentage of mothers selecting the short option over time by average weekly insurable earnings. Source: Authors' calculations.

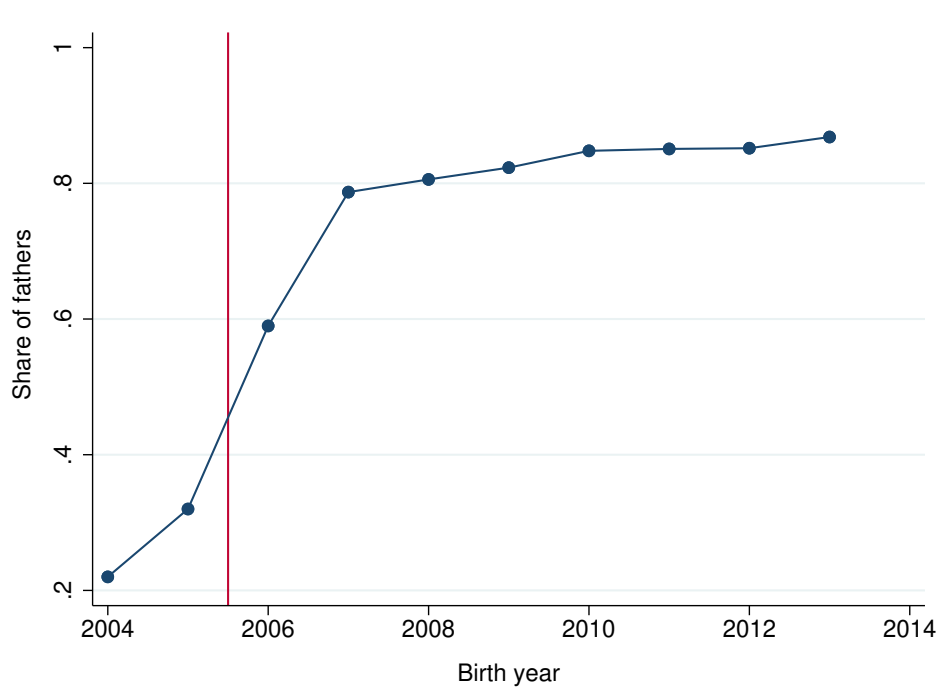


Figure 3: Share of fathers taking paternity leave

Source: Authors' calculations using QPIP administrative records for 2005 to 2013, and data from Marshall (2008) for years 2004 and 2005.

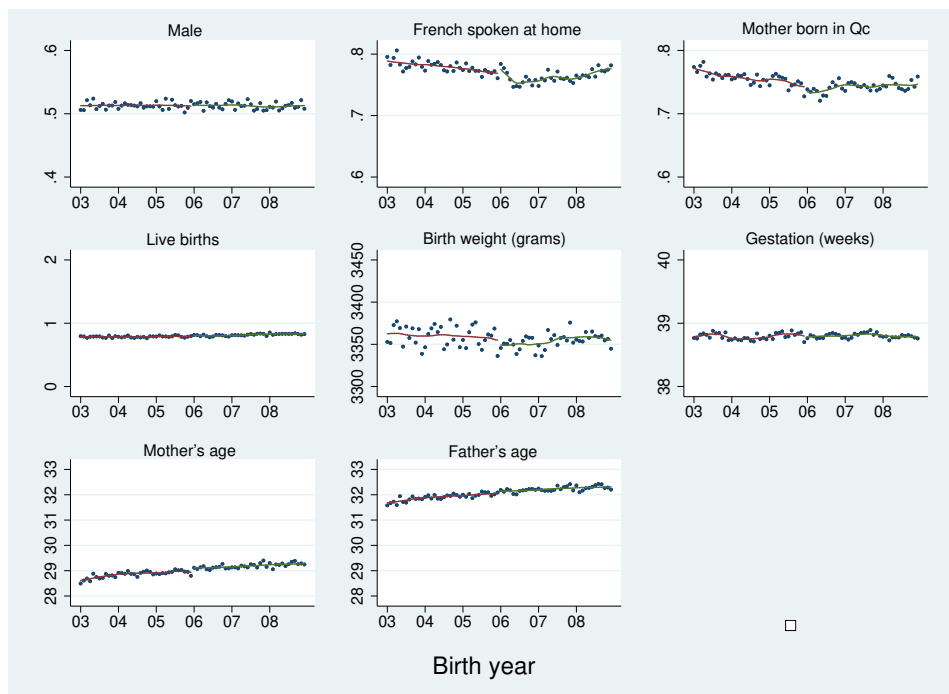


Figure 4: Child and family characteristics at birth over time

Source: Authors' calculations using the vital statistics administrative database. Includes all births in Québec.

11 Tables

Table 1: Data sets used

Data set name	Content	Subsample	Figures	Tables
Administrative parental leave data (QPIP)	Aggregate statistics on the QPIP	na	1, 2, 3	na
Employment Insurance Coverage Survey (EICS, 2002 to 2016)	Annual survey on employment insurance benefits	Mothers and fathers of a child aged 0 to 12 months	na	3 and 4
National Longitudinal Survey of Children and Youths (NLSCY, cycles 6 to 8)	Detailed biennial surveys on children and their parents from 2004 to 2008	Children born in 2003 to 2008	na	5 to 10
Survey of Young Canadians (SYC)	Detailed surveys on children and their parents in 2010	Children born in 2003 to 2008	na	5 to 10
Administrative health data (RAMQ)	All physician invoices in Québec	Children born +/- 3 months of 1st January 2006	na	11
Live birth registry (ISQ)	All birth records in Québec	Children born +/- 3 months of 1st January 2006	4	na

Table 2: QPIP vs Federal parental leave program

	as of 2001		as of 2006 in Québec only			
	Federal plan		QPIP Option 1		QPIP Option 2	
	Duration	Benefit rate	Duration	Benefit rate	Duration	Benefit rate
	(weeks)	(percent)	(weeks)	(percent)	(weeks)	(percent)
Maternity	15	55	18	70	15	75
Parental	35	55	7	70	25	75
			25	55		
Paternity	0	0	5	70	3	75
Self-employed	Not covered		Covered		Covered	
Eligibility	600 hours insurable wages		\geq \$2000 earnings		\geq \$2000 earnings	
Maximum insurable earnings						
Year 2006	39,000		57,000		57,000	
Year 2014	48,600		69,000		69,000	

Table 3: Maternal benefits by income percentile from 2002 to 2016, Québec vs RofC

Year	Weeks of benefits claimed						Weekly benefits in current dollars					
	N	Mean	P25	P50	P75	P90	N	Mean	P25	P50	P75	P90
Québec												
2002	141	30	16	28	44	50	141	279	200	300	360	410
2003	143	27	16	26	38	50	145	285	220	280	370	410
2004	128	30	15	32	44	50	129	290	220	300	370	410
2005	151	28	18	28	40	50	149	302	250	310	360	410
2006	162	27	14	26	39	50	107	404	287	407	535	590
2007	190	30	18	28	42	50	183	389	250	371	500	700
2008	200	30	17	28	40	50	192	390	250	370	500	650
2009	165	30	18	30	40	50	163	359	235	350	475	550
2010	203	30	16	30	46	50	191	379	300	373	472	550
2011	189	31	20	32	40	50	174	396	300	370	500	600
2012	164	31	20	28	44	50	155	409	272	418	525	600
2013	196	31	20	30	44	50	181	397	250	380	503	625
2014	165	31	20	30	46	50	156	409	290	400	530	600
2015	148	32	18	32	50	50	137	451	300	415	571	750
2016	183	30	18	30	40	50	165	477	349	450	600	747
Rest of Canada												
2002	581	28	14	26	40	50	572	282	210	300	350	410
2003	579	29	18	28	40	50	568	295	220	310	370	410
2004	634	31	20	30	44	50	633	282	207	300	356	388
2005	589	28	16	28	40	50	589	296	220	321	360	413
2006	568	30	17	31	42	50	570	310	250	350	376	413
2007	583	29	16	30	40	50	577	313	250	350	389	413
2008	578	30	16	30	44	50	571	323	258	360	400	413
2009	575	28	17	28	40	50	594	342	300	372	400	435
2010	562	30	18	28	40	50	561	344	283	388	412	447
2011	604	29	16	28	40	50	593	357	300	400	429	460
2012	525	30	19	28	44	50	527	358	274	403	435	483
2013	543	30	18	28	40	50	541	378	313	410	451	485
2014	518	31	20	30	43	50	516	406	358	438	460	504
2015	505	29	18	28	40	50	501	419	370	450	500	506
2016	529	29	17	28	40	50	525	416	350	452	500	520

Notes: Includes all mothers of a child aged 0 to 12 months old. Presents the mean number of weeks of benefit claimed by mothers and their weekly benefits in current dollars. These statistics are also reported for the 25th, 50th, 75th and 90th percentile of the income distribution (P25, P50, P75, P90). Statistics are computed based on the survey year and not the year of birth of the child. In 2006, mothers in Québec can therefore be under the old regime (federal program) or the new regime (QPIP). Source: Authors' computation from the non-public Employment Insurance Coverage Survey weighted data sets, 2002-2016

Table 4: Share of fathers taking a leave and duration in weeks from 2002 to 2016, Québec vs RofC

Year	Québec					Rest of Canada				
	All fathers	Fathers claimed benefits		Leave duration in weeks		All fathers	Fathers claimed benefits		Leave duration in weeks	
	N	%	N	Mean	p50	N	%	N	Mean	p50
2002	38	0.18	na	na	na	86	0.08	na	na	na
2003	33	0.15	na	na	na	79	0.08	na	na	na
2004	38	0.18	64	17	12	85	0.08	22	5	4
2005	54	0.24	86	11	8	92	0.09	50	13	7
2006	105	0.46	101	7	5	85	0.08	65	16	14
2007	161	0.65	150	6	5	88	0.09	71	15	13
2008	180	0.69	168	6	5	80	0.08	68	11	8
2009	147	0.7	137	7	5	99	0.1	81	16	12
2010	174	0.77	172	7	5	80	0.09	66	12	7
2011	181	0.76	178	6	5	95	0.1	81	13	10
2012	146	0.72	132	6	5	69	0.08	56	15	13
2013	167	0.75	159	7	5	97	0.11	81	17	15
2014	156	0.75	142	7	5	68	0.08	59	13	10
2015	134	0.77	128	8	5	86	0.1	72	15	12
2016	166	0.78	160	8	5	94	0.11	75	13	9

Notes: Includes all fathers of a child aged 0 to 12 months old. Columns 3 to 5 and 8 to 9 include only fathers who took a leave. This table presents the percentage of fathers taking a parental/paternity leave as well as the mean number of weeks of benefit claimed by those taking a leave (zero are excluded) and the mean number of week at the 50th percentile of the income distribution (P50). Statistics are computed based on the survey year and not the year of birth of the child since it is not available in the EICS. In 2006, fathers in Québec can therefore be under the old regime (federal program) or the new regime (QPIP). Source: Authors' computation from the non-public Employment Insurance Coverage Survey weighted data sets, 2002-2016

Table 5: Descriptive Statistics of 0–1-year-olds

		RofC		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 ($\geq 2500\text{g}$)	0.92	0.93	0.95	0.93
	Low (1500-2499g)	0.05	0.05	0.04	0.06
	Very low ($< 1500\text{g}$)	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. Children born between January 1st, 2003 and December 31st, 2005 are pre-reform (*Pre*) and children born between January 1st, 2006 and December 31st, 2008 are post-reform (*Post*). Source: Authors' calculations.

Table 6: Descriptive statistics on parental income from work, benefits and time investment at age zero to 1 year old

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

Note: The sample includes children aged 0 or 1 year olds, born three years before or after the reform. This table shows the average income from work, benefits and time investment before and after the reform in Québec and the rest of Canada (RofC). The column DID presents the difference-in-difference estimates without controls. The t-statistic of the DID coefficient is presented in the last column. Source: Authors' calculations.

Table 7: Descriptive statistics on child development at age 2 to 3 years old

	RofC		Québec		N	DID	t-stat
	Pre	Post	Pre	Post			
MSD (+)	98.63 (14.95)	99.32 (15.37)	97.62 (14.17)	99.44 (14.1)	10,557	1.13	1.97
Hyperactivity/Inattention (-)	3.60 (2.30)	3.75 (2.32)	3.68 (2.40)	3.64 (2.30)	10,680	-0.19	2.50
Emotional disorder /Anxiety (-)	1.23 (1.48)	1.48 (1.61)	1.35 (1.53)	1.42 (1.62)	10,747	-0.18	2.94
Physical aggression/Opposition (-)	4.58 (2.85)	4.81 (2.75)	4.58 (3.03)	4.72 (3.01)	10,666	-0.09	1.04
Separation anxiety (-)	2.54 (2.00)	2.79 (2.02)	2.60 (1.90)	2.72 (1.97)	10,751	-0.13	3.49
Child health recently (-)	1.45 (0.70)	1.43 (0.67)	1.53 (0.78)	1.46 (0.71)	10,954	-0.04	3.82
Child general health (-)	1.18 (0.49)	1.22 (0.55)	1.27 (0.65)	1.31 (0.62)	10,953	0.00	0.00

Note: The sample includes children aged 2 or 3 year olds, born three years before or after the reform. This table shows the average score for health, MSD and behavioural measures before and after the reform in Québec and the rest of Canada (RofC). Direction of improvements are marked using (+/-) : (+) a positive coefficient implies an improvement and (-) a negative coefficient implies an improvement. In other words (+) a higher score implies a more favourable outcome and (-) a lower score implies a more favourable outcome. The column DID presents the difference-in-difference estimates without controls. The t-statistic of the DID coefficient is presented in the last column. Source: Authors' calculations.

Table 8: Estimated impact on parental work and benefits

Dependent Variable	Birth years Control group	2003 to 2008				Ontario	2004 to 2007	2003 to 2008	
		Rest of Canada		RofC	RofC		RofC		
	(1)	(2)	(3)	(4)	(5)	(6)	High Educ (7)	Low Educ (8)	
Maternity leave (1:yes, 0:no)	<i>coef.</i>	0.06***	0.06***	0.05***	0.06***	0.05***	0.04***	0.06***	0.05***
	<i>std.</i>	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
	<i>N</i>	8,514	8,514	8,514	8,514	3,408	5,665	5,229	3,117
Maternal income from work (annual, \$)	<i>coef.</i>	-433	-435	-1380**	-1558***	-768***	-1009***	-1007*	-2475***
	<i>std.</i>	(499)	(520)	(617)	(545)	(54)	(375)	(530)	(529)
	<i>N</i>	9,091	9,091	9,091	9,008	3,778	5,869	5,037	3,871
Maternal benefits (annual, \$)	<i>coef.</i>	2556***	2663***	2528***	2729***	2643***	2991***	3445***	1312***
	<i>std.</i>	(287)	(230)	(246)	(192)	(182)	(110)	(295)	(281)
	<i>N</i>	9,116	9,116	9,116	9,033	3,791	5,883	5,062	3,871
Paternal income from work (annual, \$)	<i>coef.</i>	2206***	2712***	355	256	4	918	-4	-318
	<i>std.</i>	(935)	(915)	(947)	(892)	(261)	(910)	(2053)	(2401)
	<i>N</i>	4,622	4,622	4,622	4,589	2,050	3,017	2,756	1,777
Paternal benefits (annual, \$)	<i>coef.</i>	375***	383***	442***	466***	350**	163***	436***	553***
	<i>std.</i>	(95)	(92)	(74)	(75)	(57)	(50)	(119)	(108)
	<i>N</i>	4,639	4,639	4,639	4,606	2,056	3,028	2,770	1,780
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: Cluster-robust standard errors are in parentheses. Statistical significance is denoted using asterisks: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.
Source: Authors' calculations.

Table 9: Estimated impact on maternal time investment

Dependent Variable	Birth years Control group	2003 to 2008				2004 to 2007	2003 to 2008		
		Rest of Canada	Ontario	RofC	RofC High Educ	RofC Low Educ			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Child age when mother returned to work (months)	<i>coef.</i>	0.32***	0.32***	0.33***	0.33***	0.22***	0.23***	0.62***	-0.06
	<i>std.</i>	(0.08)	(0.09)	(0.11)	(0.11)	(0.00)	(0.13)	(0.14)	(0.10)
	<i>N</i>	11,093	11,093	11,093	11,004	4,449	7,243	6,199	4,646
Breastfeeding duration (months)	<i>coef.</i>	0.31***	0.31***	0.25***	0.26***	0.32**	0.15***	0.36***	0.07
	<i>std.</i>	(0.05)	(0.04)	(0.05)	(0.04)	(0.01)	(0.05)	(0.06)	(0.06)
	<i>N</i>	8,577	8,577	8,577	8,522	3,361	5,981	4,994	3,438
Breastfeeding \geq 6 months (1:yes, 0:no)	<i>coef.</i>	0.07***	0.07***	0.06***	0.06***	0.06***	0.03	0.06***	0.09***
	<i>std.</i>	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
	<i>N</i>	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	yes
Time trend	no	yes	yes	yes	yes	yes	yes	yes	yes
Child and family characteristics	no	no	yes	yes	yes	yes	yes	yes	yes
Infant health characteristics	no	no	no	yes	yes	yes	yes	yes	yes

Note: Cluster-robust standard errors are in parentheses. Statistical significance is denoted using asterisks: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. Source: Authors' calculations.

Table 10: Estimated impact on 2- to 3-year-olds

Dependent Variable	Birth years Control group	2003 to 2008				2004 to 2007	2003 to 2008		
			Rest of Canada		Ontario	RofC	RofC High Educ	RofC Low Educ	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MSD score (+)	<i>coef.</i>	1.13**	1.12*	0.80	0.97	1.83***	1.29**	0.98	0.10
	<i>std.</i>	(0.57)	(0.65)	(0.66)	(0.49)	(0.01)	(1.15)	(0.64)	(0.90)
	<i>N</i>	10,557	10,557	10,557	10,416	3409	6,976	6,058	4,093
Hyperactivity/Inattention (-)	<i>coef.</i>	-0.19**	-0.18**	-0.12	-0.10	-0.15***	-0.01	-0.14	0.12
	<i>std.</i>	(0.08)	(0.08)	(0.07)	(0.07)	(0.02)	(0.10)	(0.12)	(0.08)
	<i>N</i>	10,680	10,680	10,680	10,541	3,424	7,078	6,127	4,105
Emotional disorder/ Anxiety (-)	<i>coef.</i>	-0.18***	-0.18***	-0.16***	-0.15**	-0.17***	0.03	-0.18***	0.02
	<i>std.</i>	(0.06)	(0.06)	(0.05)	(0.05)	(0.02)	(0.06)	(0.06)	(0.07)
	<i>N</i>	10,747	10,747	10,747	10,606	3,443	7,132	6,145	4,145
Physical aggression/ Opposition (-)	<i>coef.</i>	-0.09	-0.11	-0.10	-0.05	-0.14**	0.04	-0.20	0.26**
	<i>std.</i>	(0.08)	(0.09)	(0.09)	(0.09)	(0.07)	(0.11)	(0.16)	(0.09)
	<i>N</i>	10,666	10,666	10,666	10,524	3,414	7,065	6,091	4,118
Separation anxiety (-)	<i>coef.</i>	-0.13***	-0.13***	-0.10***	-0.09***	-0.06**	-0.04	-0.02	-0.13**
	<i>std.</i>	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.06)	(0.07)
	<i>N</i>	10,751	10,751	10,751	10,611	3,447	7,131	6,142	4,148
Child health recently (-) (1:excellent to 5:poor)	<i>coef.</i>	-0.04***	-0.05***	-0.03**	-0.03***	-0.02***	-0.02***	-0.02	-0.03**
	<i>std.</i>	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
	<i>N</i>	10,954	10,954	10,954	10,806	3,501	7,249	6,206	4,203
Frequency in good health (-) (1:excellent to 5:poor)	<i>coef.</i>	0.00	0.00	0.01	0.00	0.01**	0.03*	-0.03**	0.06***
	<i>std.</i>	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)	(0.02)
	<i>N</i>	10,953	10,953	10,953	10,806	3,501	7,249	6,206	4,203
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: Direction of improvements are marked using (+/-) (see Table 7). Cluster-robust standard errors are in parentheses. Statistical significance is denoted using asterisks: *** p<0.01, ** p<0.05, and * p<0.1. Source: Authors' calculations.

Table 11: Estimated impact on health care costs

Child age		0-5 mths	6-11 mths	≤ 1 yr	≤ 2 yr	≤ 3 yr	≤ 5 yr	≤ 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: Cluster-robust standard errors are in parentheses. Statistical significance is denoted using asterisks: *** p<0.01, ** p<0.05, and * p<0.1. Source: Authors' calculations.

12 Appendix

Table A. 1: QPIP Administrative Benefits, Costs, Premium and Coverage

	2006	2007	2008	2009	2010	2011	2012	2013	2016
Benefits (million)	1,176#	1451	1561	1649	1697	1732	1803	1900	1956
Operating cost (million)	31	36	44	42	41	40	37	39	56
Payroll taxes	1,184#	1233	1344	1511	1624	1802	1929	2018	2076
Insurable earnings	57000	59000	60500	62000	62500	64000	66000	67500	71500
Premium employees	0.42	0.42	0.45	0.48	0.51	0.54	0.56	0.56	0.55
Premium employers	0.58	0.58	0.63	0.68	0.71	0.75	0.78	0.78	0.77
Premium self-employed	0.74	0.74	0.80	0.86	0.89	0.95	0.99	0.99	0.97
Births	81962	84200	87600	88600	88300	88500	88700	88600	86400
Mothers with benefits	65130	63598	67426	69289	68312	68924	70380	68945	68354
Coverage %	79.5	75.5	77	78.2	77.4	77.8	79.3	77.8	79.0

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 published administrative data from QPIP. Notes: Benefits include all maternal (maternity, adoption) and parental benefits. Mothers with benefits include adopting mothers (around 500-600 per year). 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.

Table A. 2: Descriptive Statistics of 2–3-year-olds

		RofC		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 (≤ 2500 g)	0.91	0.90	0.93	0.91
	Low (1500 -2499g)	0.05	0.06	0.04	0.06
	Very low (< 1500 g)	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. Children born between January 1st, 2003 and December 31st 2005 are pre-reform (*Pre*) and children born between January 1st, 2006 and December 31st, 2008 are post-reform (*Post*). Source: Authors' calculations.

Table A. 3: Estimated impact on healthcare costs - Robustness checks

Child age		0-5 mths	6-11 mths	≤ 1 yr	≤ 2 yr	≤ 3 yr	≤ 5 yr	≤ 7 yr
Top 1 percent censored								
All	RDDx	-14.76***	28.37***	16.03**	2.27	0.90	0.34	3.05
	(N=17819)	(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=16185)	(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=1634)	(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=17819)	(15.16)	(10.74)	(22.82)	(36.40)	(44.37)	(57.08)	(69.11)
Top 2,5 percent censored								
All	RDDx	-11.95***	27.36***	17.74***	3.80	2.00	2.28	6.94
	(N=17549)	(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=15930)	(3.32)	(2.70)	(5.43)	(9.28)	(11.78)	(15.65)	(18.90)
Assisted	RDDx	-42.69***	8.39	-33.63*	-52,10*	-62,48*	-54.74	-65.15
	(N=1619)	(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=17549)	(11.41)	(8.74)	(18.64)	(30.18)	(38.40)	(51.38)	(62.47)

Note: Standard errors are in parentheses. Statistical significance is denoted using asterisks: *** p<0.01, ** p<0.05, and * p<0.1. Source: Authors' calculations.

Table A. 4: 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 (0.045)	0.051 (0.048)	0.078 (0.074)	0.047 (0.108)	0.086 (0.134)	0.078 (0.168)	0.106 (0.189)
Otitis media	0.005 (0.012)	0.030 (0.037)	0.034 (0.040)	-0.001 (0.089)	0.094 (0.117)	0.110 (0.147)	0.117 (0.166)
Asthma	-0.005 (0.010)	-0.013 (0.027)	-0.017 (0.031)	-0.051 (0.064)	-0.084 (0.091)	-0.180 (0.134)	-0.266 (0.169)
Pyrexia of unknown origin	0.019 (0.039)	0.007 (0.028)	0.025 (0.050)	0.008 (0.074)	0.013 (0.083)	0.046 (0.091)	0.063 (0.098)
Cellulitis & abscesses	-0.014 (0.013)	-0.005 (0.004)	-0.018 (0.013)	-0.013 (0.017)	0.009 (0.038)	-0.012 (0.049)	-0.001 (0.053)
Cough	-0.003 (0.025)	0.009 (0.017)	0.006 (0.031)	-0.005 (0.040)	0.005 (0.047)	-0.008 (0.056)	-0.025 (0.068)
Bronchiolitis	0.063 (0.087)	0.062 (0.068)	0.125 (0.124)	0.193 (0.144)	0.192 (0.148)	0.193 (0.148)	0.196 (0.148)
Gastroenteritis & colitis	-0.008 (0.013)	-0.017 (0.025)	-0.025 (0.028)	-0.020 (0.053)	0.004 (0.059)	-0.007 (0.063)	-0.012 (0.065)
Angina	-0.004 (0.003)	-0.006 (0.006)	-0.010 (0.007)	0.005 (0.019)	-0.001 (0.026)	0.020 (0.039)	0.039 (0.050)
Diabetes	0.001 (0.001)	-0.001 (0.001)	0.000 (0.002)	-0.003 (0.006)	-0.007 (0.008)	0.006 (0.019)	0.014 (0.029)
Allergies	0.008 (0.010)	-0.014 (0.009)	-0.005 (0.014)	-0.010 (0.019)	-0.003 (0.021)	0.008 (0.027)	-0.006 (0.034)
Allergic rhinitis	-0.001 (0.008)	0.002 (0.006)	0.001 (0.011)	-0.006 (0.013)	0.007 (0.015)	0.034 (0.020)	0.050 (0.025)
Lymphocytic leukemia	0.001 (0.001)	0.000 (0.000)	0.001 (0.001)	0.000 (0.002)	-0.001 (0.002)	0.090 (0.110)	0.202 (0.222)
Myeloid leukemia	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.002 (0.002)	-0.003 (0.002)	-0.002 (0.004)	0.002 (0.007)
Tumor of the nervous and endocrine system	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.003 (0.014)	0.000 (0.017)

Note: Shows the DiDx estimates using the entire sample (N=18,000). Standard errors are in parentheses. Statistical significance is denoted using asterisks: *** p<0.01, ** p<0.05, and * p<0.1. Source: Authors' calculations.