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Abstract

Having children has a sizeable impact on women's labour outcomes, but not on men's. The differential effects of children by gender are referred to as child penalties, and are now documented in many countries. In this paper, we exploit the Longitudinal and International Study of Adults to estimate Canadian child penalties in both earnings and employment for a period going from five years before the birth of the first child to 10 years after. Using an event study methodology (Kleven et al., 2019a), we find large and persistent negative effects of parenthood for mothers, but not fathers. Mothers' earnings decrease by 49% the year of birth, with a penalty still at 34.3% 10 years after; the corresponding penalty in employment down 14.2%. We also document larger negative impacts of parenthood for women who had multiple children or those with a lower education level. We finally provide suggestive evidence that family policies such as parental leave and subsidized childcare may help reduce child penalties.

JEL: J13, J31, J38

Key words: child penalties, family gap, Canada, family policies, subsidized childcare

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1. Introduction

Despite notable improvements in the economic and social situation of women in recent decades, inequalities between men and women persist in many fields, a trend seen both in Canada and internationally. Indeed, women's wages have increased progressively over time, but women continue to be paid less than men on average. Between 1998 and 2016, the ratio of women's to men's hourly wage in Canada rose from 80% to 86% (Fortin, 2019). Québec[1] has a slightly higher gender wage ratio than Canada overall, with a women-to-men ratio of 89% in 2016, up from 84% in 1998 (Cloutier-Villeneuve, 2018). In the United States, the hourly wage ratio for full-time employees increased significantly during the 1980s before slowing down, rising from 64% in 1980 to 74% in 1989 and then 82% in 2010 (Blau & Kahn, 2017). Although the rise in hourly wage has been favourable for women in Canada over the last twenty years, the trend in annual earnings reveals a different story, one in which larger gaps remain. The women-to-men ratio of average annual earnings was around 69% in 2015, an increase of around 15 percentage points since 1978 (Bonikowska et al. 2019). For the younger generations, the earnings ratio has improved, but a dramatic decline past aged 30 is still observable, coinciding with the arrival of children for many households (Fortin, 2019). Whereas the gender wage ratio only considers differences in the average hourly wages of men and women, annual earnings also take into consideration differences in the number of hours and weeks worked by women and men. It therefore appears that there are still large differences between men and women, not only in terms of wage rates, but also labour intensity.

Many studies have investigated the causes of these inequalities and concluded that women have been unable to catch up to the earnings level of men in part because of parenting responsibilities (Waldfogel, 1998; Angelov et al., 2016; Kleven et al., 2019a). It is generally considered that children have a negative effect on women's productivity in the labour market by substantially reducing their human capital or work effort, which translates into a significant decrease in their earnings (Mincer & Polachek, 1974). When children arrive,

[1] Québec is the second largest province in Canada by population, with around 8.7 million inhabitants in 2022 (Statistics Canada, 2023).

mothers do, indeed, more often turn towards part-time jobs, positions offering flexible working hours, or a situation offering work conditions more favourable to family life, all of which are less profitable and pay lower wages (Joshi et al., 1999). Employers, in return, see part-time employees as less committed to their employers and performing at a lower level and hence offer them fewer bonuses and promotions (White, 2019). This may also explain why women have a hard time entering the top decile of the earnings distribution, a phenomenon that explains more than 50% of the gender pay gap in Canada (Bonikowska et al. 2019). It appears that women pay a majority of the direct and indirect childcare costs, resulting in a deterioration of their economic situation. In the literature, this phenomenon is known as the "motherhood pay gap," the "family gap," or "child penalties" (Waldfogel, 1997; Kleven et al., 2019a). Henrik Kleven, in a series of papers on the subject, contributes to shedding light on the extent of the phenomenon that women disproportionately bear parenting-related costs on the labour market (Kleven et al., 2019a; 2019b; 2021; 2022; Kleven, 2022). In Kleven et al. (2019a), the authors use administrative data from Denmark, considered to be one of the most egalitarian countries in the world, and reveal that the earnings of mothers diminish considerably following the birth of their children, whereas men's pay is not affected, leading to a long-run child penalty of 19.4%, ten years after the birth of the first child.

The first goal of our study is to document child penalties in Canada. We do so for parents who had their first child between 1989 and 2009, following Kleven et al.'s (2019a) methodology, focusing on annual earnings and annual employment. We present evidence comparing mothers and fathers, but we also look at heterogeneity among mothers along marital status, number of children, and education level. Our contribution is to present the first descriptive evidence on child penalties in Canada for a nationally-representative sample allowing us to follow individuals over the course of 15 years surrounding the birth of their first child. In earlier contributions, Phipps et al. (2001) found that mothers' incomes are 13% lower than those of women without children, even when taking into account work interruptions, but in a cross-sectional dataset (the 1995 General Social Survey). Zhang (2010) followed mothers from three years preceding the birth of their first child to nine years after and observed that earnings of mothers dip 30-40% at child birth, while regaining losses after

seven years. However, Zhang (2010) had to use maternity leave as an indicator for child birth given the nature of the data (the Longitudinal Worker File), thus narrowing the focus of his study to employed women. Karademir et al. (2023) also present evidence on child penalties, but first for a sample representative of Canadians parents born between 1963 and 1985 who had their first child before age 40 and between 1981 and 2016 (based on the Intergenerational Income Database) and second on a sample based on the Longitudinal Administrative Databank (LAD), both with no information on the education level of parents.[2] We thus believe our paper is the first to provide a comprehensive picture of child penalties in Canada by showing the impact of children on the labour market outcomes of women relative to men.

The second goal of our study is to investigate the potential effect of public policies on child penalties. To do so, we provide suggestive evidence on the influence of the federal parental leave reform and of Québec's family policies (subsidized childcare and extended parental leave) on the annual earnings and employment of mothers. Recently, both academic researchers and political decision makers have become interested in solutions to close the motherhood pay gap. One such potential solution is to eliminate access-to-employment barriers and reduce inequalities in unpaid work, especially those pertaining to parenting responsibilities. Kleven et al. (2022) explore the role of family policies in Austria and find that they had virtually no impact on the motherhood pay gap. This may lead some to conclude that family policies are not helpful for reducing the motherhood pay gap. However, we argue that the Austrian policy mix and social norms likely explain the result and may not have external validity for family policies designed differently. Likewise, Karademir et al. (2023) suggest that the role of grandparents in providing childcare can explain Kleven et al.'s (2022) findings.

In this paper, we provide suggestive evidence that a different policy mix leads to different results. More specifically, we study the impact on the motherhood earnings gap of

[2] The LAD contains longitudinal fiscal data and is representative of the Canadian population. The timing of birth can be identified so long as parents claimed child benefits at some point in the child life. As of 1993, parents had a strong incitive to declare their child and claim benefits.

policies supporting women's employment in Canada. We focus our attention on two policies: parental leave and childcare. Using a difference-in-differences approach, we investigate whether the Québec childcare policy combined with a more targeted parental leave program helped reduce child penalties. Compared to the Austrian setting, the Québec context is very different. The labour force participation of mothers is remarkably higher, the gender pay gap lower, and the childcare participation of children aged 1 to 2 much higher. To our knowledge, only Karademir et al. (2023) also study the short- and long-term effects of family policies on the family gap, using different Canadian datasets, and with a focus on care provided by grandparents and grandmothers' earnings and labour force participation.

Our main findings are as follows. We use the Longitudinal and International Study of Adults (LISA), a database that includes a longitudinal study coupled with historical administrative fiscal records, and find that the earnings of mothers diminish dramatically following the birth of their first child, with the loss estimated at 49% for the year of birth. The earnings of fathers, on the other hand, are not affected by the arrival of the first child. Over the long term, which is to say ten years after the birth of the first child, women in Canada continue to be paid less than they earned before the birth of their first child and less than men, with a long-run child penalty of 34.3%. When looking at annual employment, we find a smaller but still substantial long-run penalty of 14.2%. We do not see large differences between married mothers and those in common-law partnerships, but we do observe stronger effects of motherhood for those with more children and those with a lower educational attainment. Finally, we find suggestive evidence that the Québec family policies have a positive impact in reducing pay gaps between mothers and fathers, especially in the long run. Québec mothers who gave birth to their first child in 2001 or later see their earnings increase more quickly in subsequent years than mothers in the rest of Canada or than Québec mothers whose first child was born before 2001. The long-run impact of children was reduced by 17 percentage points in Québec, from –40% to –23%. In comparison, the impact for mothers in the rest of Canada went from –39% to –33%. The overall effect of Québec family policies on earnings is therefore 11 percentage points; for employment, it is 8 percentage points. Our analysis is however limited by the number of observations in the LISA, which is not large enough for us to detect statistically significant effects. Further work in the

area should exploit data sources with significantly more observations, as Karademir et al. (2023) do.

The paper is structured as followed. We first briefly review the literature on the child penalties and provide the institutional context of our study in Sections 2 and 3. We then present our data and empirical strategy in Sections 4 and 5. Our findings can be found in Section 6. We conclude in Section 7.

2. Selected literature review

Since the seminal work by Hill (1979), many studies have examined the effect of motherhood on women's labour supply and earnings (Waldfogel, 1995; Waldfogel, 1998; Lundberg & Rose, 2000; Angelov et al., 2016). The literature that developed over the last three decades covers a wide body of research that uses sophisticated estimation methods to account for endogeneity and selection bias to establish a causal relationship. Given that having a child is a choice and that people who make that choice may differ from those who decide not to have a child, a simple comparison of the earnings of mothers and women without children is insufficient to declare a causal effect of having a child. For example, women who plan to have one or more children, knowing that this will interrupt their career, might be less inclined to invest in their education and therefore be subject to slower professional advancement, which is a case of endogeneity (Budig, 2014). Similarly, women with lower earnings may be ones who choose to have children, since the opportunity cost is lower, which creates a selection bias (Jacobsen et al., 1999). Researchers therefore turn to fixed-effect models (Zhang, 2010), instrumental variables (Miller, 2011), or Heckman selection models (Misra et al., 2011) to study the relationship between earnings and motherhood. These methods make it possible to overcome problems introduced by endogeneity and selection bias, and therefore to estimate a relationship of cause and effect (and not just a correlation).

A growing number of studies also use data from administrative sources to lend additional credibility to their results (Kleven et al., 2019a; Fernández-Kranz et al., 2013). Many studies have also looked at the motherhood pay gap for various population subgroups,

including based on education level (Anderson et al., 2002), ethnic origin (Glauber, 2007), marital status (Budig & England, 2001; Budig & Hodges, 2010), immigration status (Srivastava & Rodgers, 2013) and income distribution (Budig & Hodges, 2010; Kellewald & Bearak, 2014). Nonetheless, comparing estimates from different studies is a difficult exercise given the differences that may exist in the samples studied and the methodology used. Several studies have therefore used harmonized international data, such as the Luxembourg Income Study[3] (Harkness & Waldfogel, 2003; Misra et al., 2011; Budig et al., 2016) or the International Social Survey Programme[4] (Dupuy & Fernández-Kranz, 2011; Blau & Kahn, 2003) to provide comparable estimates across countries. Significant variations are generally found between countries: cross-sectional motherhood pay gap estimates vary from – 42% to +4%, with large gaps generally found in less-developed countries and gaps favouring mothers in Nordic countries (Grimshaw & Rubery, 2015). Few of these studies, however, analyze possible sources of variation to explain these international differences. On this subject, Misra et al. (2011) look at the relationship between various policies to establish a work–family balance and the motherhood pay gap in 21 countries. Their results show that some policies, such as maternity leave and daycare services for young children, are positively associated with mothers joining the workforce, while the effect is more ambivalent in the case of others, including parental leave. These results were confirmed by Budig et al. (2016) and Olivetti and Petrongolo (2017). The longer the leave, the greater the negative effect felt on earnings. A relationship also exists between the generosity level of family policies and the motherhood pay gap. The penalties associated with maternity are greater in southern Europe (Dupuy & Fernández-Kranz, 2011), while the lowest penalties are generally found in northern European countries (Harkness & Waldfogel, 2003).

Recently, a study conducted by Kleven et al. (2019a) played an important role in reopening the debate on inequalities between men and women and, more specifically, the parenting burdens disproportionately borne by women to the detriment of their professional

[3] The Luxembourg Income Study contains detailed microdata from around 50 countries covering five decades (Cross-National Data Center in Luxembourg, n.d.).
[4] The International Social Survey Programme is a transnational collaboration running annual surveys on various topics (International Social Survey Programme, n.d.).

career. Since that study was published, scientific articles addressing this subject have proliferated, and both academic researchers and political decision makers have turned their attention from whether a pay gap exists to factors that could possibly serve to reduce it. Kleven et al. (2019a) use a large Danish administrative database that is rich in socioeconomic variables. Their base sample comprises about 470,000 births and 15,040,000 observations collected annually over the years. They estimate the effect of the arrival of children on various aspects of the parents' work life, specifically earnings, participation in the workforce, hours worked and hourly wage. Their results show that during the years before the birth of the first child, the future parents have identical earning trajectories. However, when the child arrives, women experience a drastic loss in earnings (approximately 30% compared with what they earned the year preceding the birth), whereas the fathers' earnings are unaffected following the birth of their children. During the following years, the mothers' lost wages are partially regained, but a 19.4% gap remains after ten years—the so-called long-run child penalty. Kleven et al. (2019a) advance that the reasons for the loss in earnings may lie with three factors: the number of hours worked, labour force participation and the hourly wage. They further assert that these three factors are negatively associated with the birth of a child for mothers, while the same factors do not appear to have been affected in any way for fathers. These study results show that even in a country with a solid social security net (Denmark), women are not immune from the child penalty. Another important contribution of Kleven et al. (2019a) is their careful argumentation—through a comparison with a difference-in-differences approach where individuals without children are used as counterfactual, and with an instrumental variable approach using sibling sex mix—that their event study methodology is appropriate to identify causal effects.

The provisions of a parental leave policy with job protection, including maternity leave and parental leave that can be shared between the two parents, are generally implemented for the purpose of offering parents the possibility of spending more time with their newborn, while also guaranteeing that the same work conditions will be in place following the leave. A system of parental insurance that is advantageous in terms of time and financial compensation is considered to be a concrete measure to ensure a work–family balance for both women and men, but in the majority of cases, women are the main beneficiaries. Earlier

studies have shown that women's professional trajectories tend to progress more linearly in countries with measures promoting such a balance (Blau & Kahn, 2003).

The effect of childcare policies on various outcomes have also been largely documented. Baker et al. (2008) and Lefebvre & Merrigan (2008) have demonstrated quite robustly the impact of the Québec affordable childcare reform on workforce participation by mothers using two distinct microdata sources. Lefebvre et al. (2009) and Haeck et al. (2015) later confirmed the results of earlier studies and find that the positive effects persist in the long term. Studies on maternal employment and daycare services have also been conducted in other countries. The majority of these studies find a positive association between the availability of daycare services and mothers' level of employment (e.g. Bauernschuster & Schlotter (2015) in Germany, Berlinski & Galiani (2007) in Argentina, Bettendorf et al. (2015) in the Netherlands, Givord & Marbot (2015) in France, and Kunze & Liu (2019) in Norway). These documented effects suggest a shift in the labour force participation of treated mothers and the question we investigate in this paper is whether this shift helped reduce the motherhood pay gap.

While the literature offers a certain number of studies on child penalties, few tackle the effect of family policies on those penalties. Kleven et al. (2022) exploit various changes in the family policies of Austria to estimate the impact on the motherhood pay gap. The authors find that generous parental leave of up to 35 months combined with affordable childcare did not reduce child penalties. While the authors argue that the Austrian context is not unique, it is different from the Canadian or Québec context. Parental leave can last for up to 35 months in Austria relative to 12 months in Canada. This prolonged parental leave may entice women to remain out of the labour force for a prolonged period after childbirth, which data on childcare seem to support: childcare participation of children aged 1 and 2 is indeed fairly low, at around 25% (Kleven et al., 2022). In contrast, in Québec, childcare participation of children aged 1 to 4 increased from around 40% to 75% between 1996 and 2008 (Haeck et al., 2015), with a similar increase amongst children aged 1 to 2. Parallel to this increase, the labour force participation of mothers of children aged 1 to 4 increased from less than 55% in 1996 to more than 70% in 2008 (Haeck et al., 2015).

Andresen and Nix (2022) provide evidence from Norway on heterosexual nonadopting and adopting couples, and same-sex couples. While they do not offer a causal evaluation of the impact of family policies, they conclude that gendered preferences towards child care are, along with gender norms and discrimination, explain in large part the child penalty among heterosexual couples. This finding is thus somewhat at odds with the conclusion of Kleven et al. (2022). However, Karademir et al. (2023) argue that grandparents may be the missing piece of the puzzle and explain the divergent findings. They posit that another factor to consider is the availability of other forms of child care, in particular care provided by grandparents. The impact of child care subsidies would thus depend on the pre-existing child care arrangements and the prevalence of grandparent-provided care.

3. Reforms and family policies

In this section, we describe the various reforms and programs introduced in Québec and the rest of Canada since 1997 aimed at fostering work–family balance and providing parenting support. Québec stands out from the other Canadian provinces when it comes to these policies. To better understand the specific situation in Québec, we begin by explaining the implementation of the reduced-contribution daycare services program and then look at changes to parental leave programs.

3.1. Québec's affordable childcare reform

In September 1997, Québec initiated a low-fee childcare reform. At the time, the cost per day was set at $5 per child and services were open ten hours a day, 261 days a year. The first spaces were made available for children four years of age only as of September 1997. The program was then rolled out year over year to make the network accessible to all preschoolers. Three-year-olds became eligible in September 1998, children aged two in September 1999 and children aged zero to one in September 2000. By 2000, the total number of subsidized spaces had reached 150,000 and by 2012, over 220,000 spaces were available (Haeck et al., 2015, Figure 1), covering over 65% of eligible children. The single rate of $5 per day was increased on a few occasions but remains low at $8.70 in 2022. Childcare expenditures provide a tax credit that varies according to income. The subsidized fee is

deductible at the federal level such that the actual cost to parents is lower than $8.70. Private childcare expenditures are deductible at both the provincial and federal level such that parents who opt for unsubsidized private childcare (by choice or due to the lack of spaces at preferred daycare services) pay a fairly low price as well. As a result, the cost of childcare in Québec appears to be comparable to that of Austria, but operating hours are longer in Québec where childcare facilities must be open at least 10 hours per day, relative to nine hours in Austria (Kleven et al., 2022).

This reform has had a major impact on the lives of children and their families. As mentioned earlier, before the reform, in 1996, nearly 60% of children aged 1 to 4 were in the care of their parents and by 2008, 75% were in family-based care or center-based-care (Haeck et al., 2015). Within ten years, the world of preschoolers in Québec was completely transformed. As mentioned above, many studies showed that mothers also responded to the reform by joining the workforce. Baker et al. (2008), Lefebvre & Merrigan (2008) and Haeck et al. (2015) found that the introduction of this program had a significant positive effect on mothers' employment. The year-round availability of low-fee childcare open 10 hours a day enabled mothers to return to the labour market following the birth of a child. Haeck et al. (2015) estimated that the number of employed mothers increased 12 percentage points following the reform and that the increase has been maintained through the years. As a result, the reform directly contributed to supporting the attachment of mothers to the labour market and to ensuring that they were able to go back to the job they held before the birth of their child. It is therefore possible that this reform helped reduce child penalties in earnings and in employment.

3.2. Parental leave reforms

Following implementation of the reduced-contribution daycare services program, two parental leave reforms were introduced. Firstly, in January 2001, to encourage work–family balance and ensure a better start to life for young children, the Canadian government modified the employment insurance program (Human Resources and Skills Development Canada, 2005). In practice, the federal government improved parental insurance through the employment insurance program by increasing the length of paid parental leave from 10 to

35 weeks. As part of the reform, the eligibility criterion for parental leave was also lowered from 700 hours of insurable employment in the year preceding the birth to 600 hours. The rate of coverage for the additional weeks was set at 55% of the insurable annual income up to a threshold of $39,000 in 2001 (Baker & Milligan, 2008; Marshall, 2003).

This reform, which extended leave time considerably, makes it much more likely that employment income during the year following the birth decreased compared with parents who did not enjoy the reform's benefits. Furthermore, parents—especially mothers—who found the leave too short prior to the reform were no longer forced to leave their job to continue caring for their children of less than one year. In this context, it is possible that the reform had an overall positive effect on the earnings trajectories of new parents, at least over the long term, by encouraging continuity in labour force participation. According to a study conducted by Marshall (2003), the proportion of women who return to the labour market after a long leave (nine to 12 months) rose from 8% in 2000 to 47% in 2001, just one year after the reform came into effect. A large majority of mothers who return to work quickly after giving birth are self-employed workers or ineligible employees.

Baker & Milligan (2008, 2010) use the 2001 Canadian parental leave reform to document the effect of extending maternity leave on the development and wellbeing of children. Their results show that, following the reform, mothers who took a leave spent from 48% to 58% more time away from the workforce during the first year of their child's life. This extension in the length of parental benefits may have had the effect of modifying the behaviour of mothers and fathers on the labour market. Benefits based on previous earnings encourage women to work before motherhood, and women entitled to paid leave are more likely to reenter the labour market after childbirth (Rønsen & Sundström, 2002). However, this study also shows that long leave entitlements are associated with adverse labour force reentry effects (Rønsen & Sundström, 2002).

Secondly, since January 1, 2006, parents in Québec have benefited from improved leave compared with the federal program under the Québec Parental Insurance Plan (QPIP). Several aspects distinguish QPIP from the federal program, starting with the addition of dedicated leave for the father, followed by improved benefits for both parents. A shorter

leave option is also offered at a higher replacement rate. Haeck et al. (2019) review in details the QPIP.

All of these reforms are part of a progressive societal movement aimed at getting away from the traditional gender roles by compensating mothers for income losses around the birth of a child and facilitating the return to work by providing affordable childcare.

4. Methodology

To estimate the impact of parenthood, we use an event study methodology that exploits the longitudinal nature of our data set. We note that an increasing number of economic studies use this approach to explore issues pertaining to economic consequences associated with the birth of children (Zhang, 2010; Kleven et al., 2019a; Kuziemko et al., 2018; Angelov et al., 2016).

For a sample of parents, we begin by defining the event as the year the first child was born and build a series of time indicators over a 15-year period around the birth. All years are then indexed so we can observe personal earnings or employment trajectories relative to the birth of the first child ($\tau = 0$ or event time zero). The years observed are from five years before the birth ($\tau = -5$) to 10 years afterwards ($\tau = +10$) — in other words, the period $-5 \leq \tau \leq 10$.

To analyze changes in the parents' outcome occurring within the 15-year window around the birth of their first child, we follow Kleven et al. (2019a) and estimate this multiple linear regression model using ordinary least squares:

$$Y_{ist}^{g} = \alpha^{g} D_{ist}^{Event} + \beta^{g} D_{ist}^{Age} + \gamma^{g} D_{ist}^{Year} + \mu_{ist}^{g} \quad (1)$$

In this model, the dependent variable Y_{ist}^{g} represents either annual earnings (employment income) in calendar year s in real terms, i.e., corrected for inflation and expressed in constant 2016 dollars, for individual i (of gender g) and event time t, or annual employment, a dichotomous variable equal to one if individual i has positive employment income during year s, and zero otherwise. The term D_{ist}^{Event} is a set of dummy variables

indexing event time, or time relative to the birth of the first child. Parameters of interest, specifically parameters measuring changes in outcome following the birth of a first child, are represented by the vector α^g. These parameters are indexed with respect to the birth of the first child, i.e., from five years before to ten years after. In our estimations we omit the dichotomous variable associated with $\tau = -2$. The estimated α^g coefficients measure the average effect of the arrival of a child on the parents' outcomes and are expressed in relation to the outcome two years before the birth.[5]

The two remaining sets of terms include age and calendar age fixed effects. Adding fixed age effects to the model makes it possible to control for effects related to life cycle by comparing individuals of the same age. We also introduce year fixed effects to take into account temporal differences observed during the period. The final term, μ_{ist}^g, is the model's error term. We estimate Equation (1) separately for mothers and fathers (gender g).

The resulting $\hat{\alpha}^g$ coefficients are expressed in levels, which means that they represent variations in reported earnings in dollars or annual employment in proportion. To convert these estimates to percentage differences, we apply the conversion method used by Kleven et al. (2019a). This method involves dividing each estimated coefficient $\hat{\alpha}^g$ by the predicted outcome absent the birth of the child. The formula to obtain P_t^g is therefore: $P_t^g = \frac{\hat{\alpha}^g}{E[\tilde{Y}_{ist}^g|t]}$, where $\tilde{Y}_{ist}^g$ is the predicted outcome absent the child of the birth, i.e. omitting the event time coefficients. Using this methodology allows us to keep in our estimation of Equation (1)

[5] Given that pregnant women are eligible for maternity leave several weeks before the expected delivery date earnings and employment are projected to decrease as early as the calendar year preceding the birth, $\tau = -1$. Indeed, in the case of births occurring at the beginning of a year, the withdrawal from the labour market takes place during the calendar year preceding the birth. Historically, maternity leave can begin earlier in Québec than in other Canadian provinces relative to the expected delivery date. In Québec, it currently can begin 16 weeks before the expected delivery date, compared with 12 weeks in the rest of Canada (Government of Canada, n.d.; Government of Québec, n.d.). Moreover, pregnant women in Québec in certain occupations are eligible for preventative leave, a programme managed by the work safety commission that covers about 50% of births (Commission des normes, de l'équité, de la santé et de la sécurité du travail, n.d.; Takser, 2013). Kleven et al. (2019a), who had complete information concerning the children's date of birth and a considerably larger sample, demonstrated that in limiting their analyses to births occurring in January, a slight decrease in employment income was observed for the calendar year preceding the birth, which supports our choice of year of reference.

observations with earnings of $0, while still presenting findings showing deviations in percentages. In our comparison of mothers to fathers, the child penalty is defined as the difference in P between women and men, and the long-run penalty is the one evaluated 10 years after the birth of the first child. Note that the long-run penalty captures the total effect of children, not just the first child, since in our main analysis we do not restrict the sample to those having only one child. When we look at heterogeneity of the impact of motherhood among mothers according to marital status, number of children or education level, we estimate a version of Equation (1) in which we add full sets of interactions between our model and the dimension that we want to study, resulting in separate sets of P_t by marital status, number of children or education level.

Finally, we tweak Equation (1) to provide suggestive evidence on the impact of family policies with a focus on two main policies: the Canadian parental leave reform and the Québec reform that brought in reduced-contribution daycare services. The Canadian parental leave reform was implemented in January 2001 while the Québec childcare program first started in September 1997, but it was not until 2001 that all children under the age of five were eligible for year-round daycare services at a reduced rate. As a result, our post-reform period starts in 2001. We use a difference-in-differences quasi-experimental approach, in which we estimate Equation (1) while adding indicators for residing in Québec at the time of the birth of the first child (compared to the rest of Canada) and for a first child birth in 2001 and later (compared to before 2001), and a full set of interactions between the two indicators and the event time dummies. Note that we do not include full interactions with the age and calendar year dummies due to the relatively small number of observations in the treated region (Québec, especially for the post period).

This method provides evidence on the intention-to-treat (ITT) effect, since we are not able to use administrative files to identify parents whose children actually attended a subsidized daycare or those who benefited from parental benefits.[6] According to Findlay & Kohen (2012), who use data from the 2010 Survey of Young Canadians, most mothers living

[6] This information is available in the LISA data starting with Wave 2, but it concerns only children born during the reference period, between January and May 2014, thus excluding all births we study.

in Québec and working the year before birth (97%) reported having taken paid leave of about 48 weeks. McKay et al. (2016) show that the proportion of Québec mothers eligible for parental leave rose from 80.5% to 89.3% between 2007 and 2013, representing an increase of 8.8 percentage points over that period, while the proportion remained relatively stable (64%) in the rest of Canada over the same period. The relatively high use of parental leave in Québec ensures that we include in our sample a large proportion of parents likely to have benefited from the changes in Québec's family policies. Likewise, according to data from the Québec Ministry of Family (Ministère de la Famille, n.d.), 56.6% of children under the age of five attended a regulated daycare in 2013. In addition, estimating the effect on the total population rather than on those who actually benefited from the reform provides the advantage of potentially measuring the total indirect impact of the reforms.

In all our analyses, we use the sampling weights provided by Statistics Canada with the LISA data to ensure that the Canadian population was accurately represented. All standard errors are robust to heteroskedasticity.[7] The main limit of our study, as mentioned earlier, is the small sample size and, as a result, wide confidence intervals. As a result, we present the difference-in-differences results as suggestive evidence rather than strong causal effects. In contrast, Karademir et al. (2023) present evidence of the causal effect of the reform using administrative data. In contrast to theirs, our data identify parents even if they did not file a tax report or did not claim benefits—though these are rare occurrences in the LAD according to the authors. Our results support their findings on the effect of subsidized childcare on child penalties.

5. Data, sampling strategy and descriptive statistics

Our study is based on the Longitudinal International Study of Adults coupled with individual longitudinal fiscal data (T1 forms) (Statistics Canada, 2014; 2016). The LISA is

[7] Additional analyses (not presented here) showed that the use of standard errors clustered by individual or by province, as well as by the number of children per person, did not significantly change the value of the standard errors. For this reason, we opted to retain heteroscedasticity-robust standard errors, replicating the methodology used by Kleven et al. (2019a).

administered by Statistics Canada. It was developed to provide longitudinal information pertaining to the labour market, education, family, and health from Canadian respondents. Every two years, permanent study members selected in Wave 1 in 2012 are interviewed. Individuals who have joined the members of the permanent household between waves are added to future waves, as are children in the household when they reach the age of 15. Wave 1 included about 16,000 households, for a total of about 32,000 respondents, while Wave 2, in 2014, numbered 11,000 households, with 32,000 individuals. For this study, we use the first two waves of LISA to identify birth history and sociodemographic characteristics along with T1 forms from 1982 to 2019.

One of the leading characteristics of the LISA is the matching of database information with longitudinal tax records from the Canada Revenue Agency (CRA). Individual T1 forms (a form used for declaring income to the CRA) are available yearly since 1982. These provide detailed annual information on different sources of income, such as personal and family income before and after taxes, government transfers and capital gains, as well as marital status and province of residence.

We select our sample according to the following specifications. Firstly, we restrict our attention to parents experiencing their first births between 1987 and 2009 inclusively. Secondly, since the topic of the study is labour market outcomes, the sample was first restricted to individuals who were of working age, specifically 19 to 51, during the observation period (1982 to 2019).

Table 1 presents some descriptive statistics for mothers in our sample, according to whether they gave birth to their first child before 2001 or after 2000 and whether they resided in Québec or the rest of Canada at the time.[8] One of the goals of this study being to provide suggestive evidence on the effect of the family policies introduced after 2000 on child penalties, it is useful to first consider the composition of the sample to make sure the different groups are sufficiently homogenous to be able to attribute the observed impact to an effect of the policies rather than to differences in group characteristics (either inherent in the

[8] Comparable statistics for fathers are presented in Appendix Table 1.

sample or actually seen in the population). We have two distinct groups separated into two time periods. The two groups appear to be similar in composition with respect to several variables. The median year of birth of mothers is similar in the two groups: 1965 or 1966 for the pre-reform period and 1977 for the post-reform period. Post-reform mothers are of course born later since these are mothers who gave birth for the first time after 2000. The mother's age at the birth of her first child increased slightly before and after the reform, from around 27.8 to 28.8 years of age. This upward trend is observed in both Québec and the rest of Canada, and it can also be seen in the overall population, from 25.1 in 1982 to 28.5 in 2011 (Statistics Canada, 2018).

Table 1: Sociodemographic characteristics of mothers who gave birth to their first child before and after 2001, in Québec and in the rest of Canada

	Québec		Rest of Canada	
	Pre reform	**Post reform**	**Pre reform**	**Post reform**
Sociodemographic characteristics				
Median year of birth	1965	1977	1966	1977
Born in Canada	0.92	0.93	0.82	0.72
Family characteristics				
Age at the time of the first birth	27.9	28.6	27.8	28.8
	(5.8)	(5.5)	(8.5)	(7.8)
Number of children (continuous)	1.96	2.15	2.22	2.04
	(0.98)	(0.99)	(1.31)	(1.36)
Number of children (dummies)				
One child	0.30	0.23	0.17	0.27
Two children	0.49	0.49	0.54	0.51
Three children or more	0.21	0.28	0.29	0.23
Marital status at $\tau = 0$				
Married	0.43	0.22	0.71	0.66
Common-law partner	0.27	0.61	0.06	0.11
Separated/divorced/widowed/single	0.29	0.17	0.23	0.23
Education				
Years of education (continuous)	14.1	15.2	14.7	15.4
	(4.0)	(3.8)	(4.3)	(4.0)
Highest diploma (dummies)				
No diploma	0.08	0.04	0.05	0.03
Secondary diploma	0.18	0.07	0.23	0.17
Post-secondary diploma	0.42	0.45	0.39	0.37
University diploma	0.32	0.44	0.33	0.43
N (Mothers-years)	6,100	3,200	21,000	9,500
N (Mothers)	400	200	1,400	600

Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019).

Note: Except for the median year of birth, the numbers in the table are averages, weighted with the sampling weights provided by Statistics Canada. Standard deviations for continuous variables are displayed in parentheses. Number of observations rounded to the closest hundred to respect Statistics Canada's disclosure rules.

The average number of children for Québec women (1.96) before 2001 is lower than for women in the rest of Canada (2.22). This number increases in Québec post-reform (2.15) but decreases in the rest of Canada (2.04). In Québec, 21% of women had three or more children pre-reform, compared with 29% in the rest of Canada. These numbers are higher than the fertility rate observed in the entire population because our sample excludes women without children. Marriage is a lot less common in Québec than elsewhere in Canada before 2001 (43% in Québec compared to 71% in the rest of Canada), and this difference increases over time (22% in Québec compared to 66% in the rest of Canada).

Finally, the education gap between the two groups is relatively small. The gap is 0.6 years of schooling before and 0.2 years after the reform. In terms of the highest level of schooling completed, 8% and 4% of mothers in Québec have no diploma for the two periods respectively, compared with 5% and 3% of women in the rest of Canada. Post-reform, mothers in Québec are more likely to have a post-secondary diploma, but less likely to have a university diploma relative to mothers in the rest of the country.

6. Results

We start with a descriptive account of earnings and employment trajectories for fathers and mothers to provide estimates of child penalties in Canada. We then show evidence on the heterogeneity of the impact of motherhood by marital status, number of children, and education level. Finally, we present suggestive evidence on the effect of family policies on the impact of children.

6.1 Estimated effects of parenthood for mothers and fathers

We begin by presenting the estimated impact of children in earnings and employment in Figure 1. The coefficients shown graphically represent variations in the earnings (top panel) and employment (bottom panel) of mothers and fathers relative to two years prior to

child birth. The effects of parenthood for mothers and fathers are shown separately on the same figure. The shaded areas represent 95% confidence intervals.

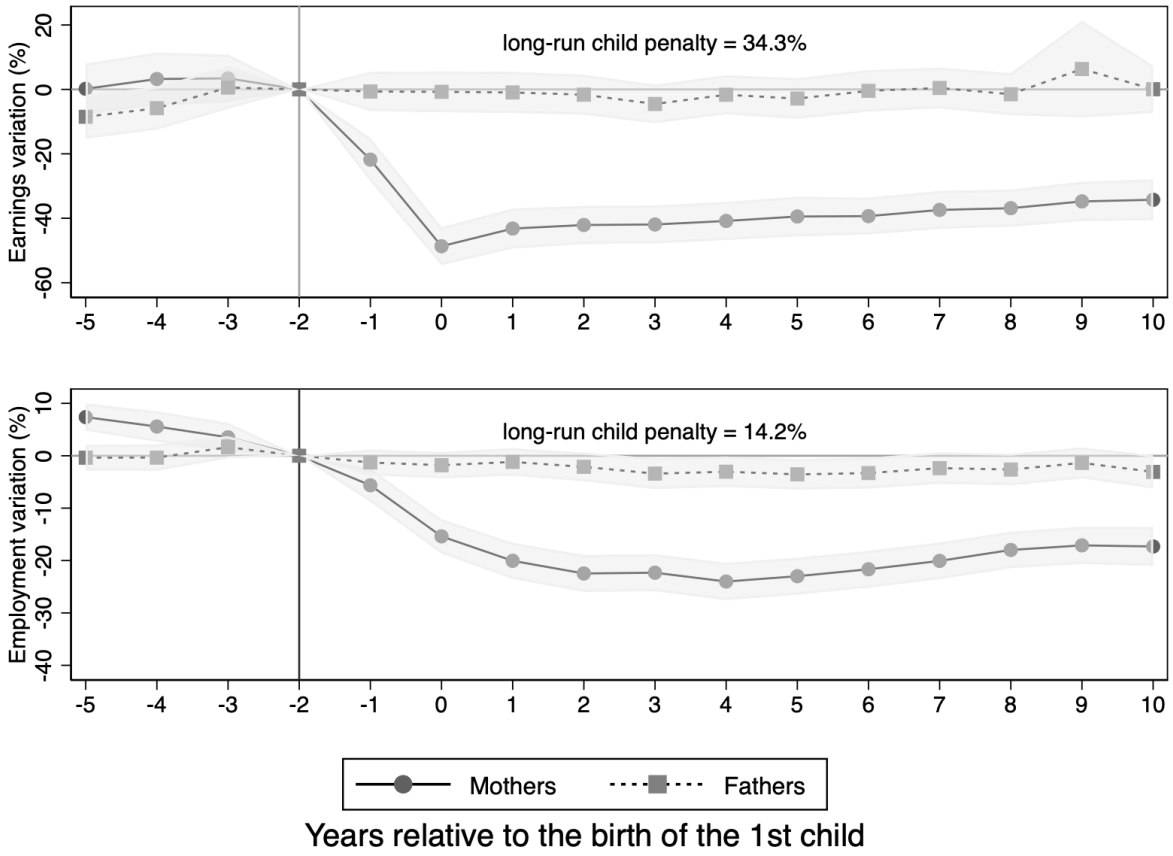
Firstly, the results show that the earnings trajectories of men and women are similar during the years preceding the birth of their first child. This is not to say that their earnings *levels* are the same, but rather that, in comparison with the reference year (two years prior to the first childbirth), their earnings *variations* are similar. Stark differences emerge on the year of the birth of the first child: women experience a drop in earnings of 49%, while men do not see their earnings affected by the birth of their first child. Although mothers recover a small amount of the lost earnings in subsequent years, ten years after the birth they are still making less than they did before having a child. On average, their earnings are down 34.3%, which leads to gender differences (variation for fathers minus variation for mothers) at $\tau = 10$, or long-run child penalties, of 34.3% since the effect of the first child for fathers is estimated at 0.05%. It should be noted here that the event study is with respect to the birth of the first child, but the majority of these mothers got on to have other children in this ten-year period. For this reason, the effect measured here takes into account not only the short-term effect of the first child but also the long-term effect of other children born during the observation period.

The top panel of Figure 1 raises another point: mothers' earnings decrease by about 20% starting in the year before the birth, or $\tau = -1$. Since we do not have information about the children's month of birth, we are unable to validate the hypothesis put forward earlier that this decrease in earnings is the result of early maternity leaves and preventive withdrawals from the labour force in the case of births occurring early in the year. However, Kleven et al. (2019a) show that by concentrating solely on January births, all labour market variables negatively affected during calendar year $\tau = -1$, which supports our initial hypothesis.

The bottom panel of Figure 1 shows variations in employment for fathers and mothers. We see a similar pattern as that regarding earnings (top panel): fathers are, by and large, unaffected by the birth of their first child while women experienced large and persistent negative effects. A difference with the top panel is that the largest negative effect for women

is not at the year of birth of the first child, but rather four years later, with estimated effects of -15% in $\tau = 0$ and -24% in $\tau = 4$. After 10 years, employment variations are -17.3% for mothers and -3.1% for fathers, leading to a long-run child penalty of 14.2%.

Figure 1: Impact of children for mothers and fathers



Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019)
Note: The values shown on the y-axis correspond to changes as a percentage based on estimated coefficients. The results are weighted using the sampling weights provided by Statistics Canada. Shaded areas represent 95% confidence intervals. The standard errors are heteroscedasticity-robust. Top panel shows variations in earnings; bottom panel shows variables in annual employment. Long-run child penalties computed as difference between fathers and mothers at time $\tau = 10$.

Compared to findings from other countries reported by Kleven et al. (2019b), child penalties in earnings in Canada are similar to those in the United States (31%) and to some extent the United Kingdom (44%), but larger than those in Denmark and Sweden (21% and

26%, respectively) and smaller than those in Austria and Germany (51% and 61%, respectively). We note however that the long-run penalties in employment are in line with those of Denmark (13.0%, as reported in Kleven et al. (2019a)). This suggests that the difference between Canada and Denmark in terms of child penalties in earnings does not stem from divergences at the extensive margin of the labour market (whether or not to work), but either at the intensive margin (how much to work) or the wage rate.

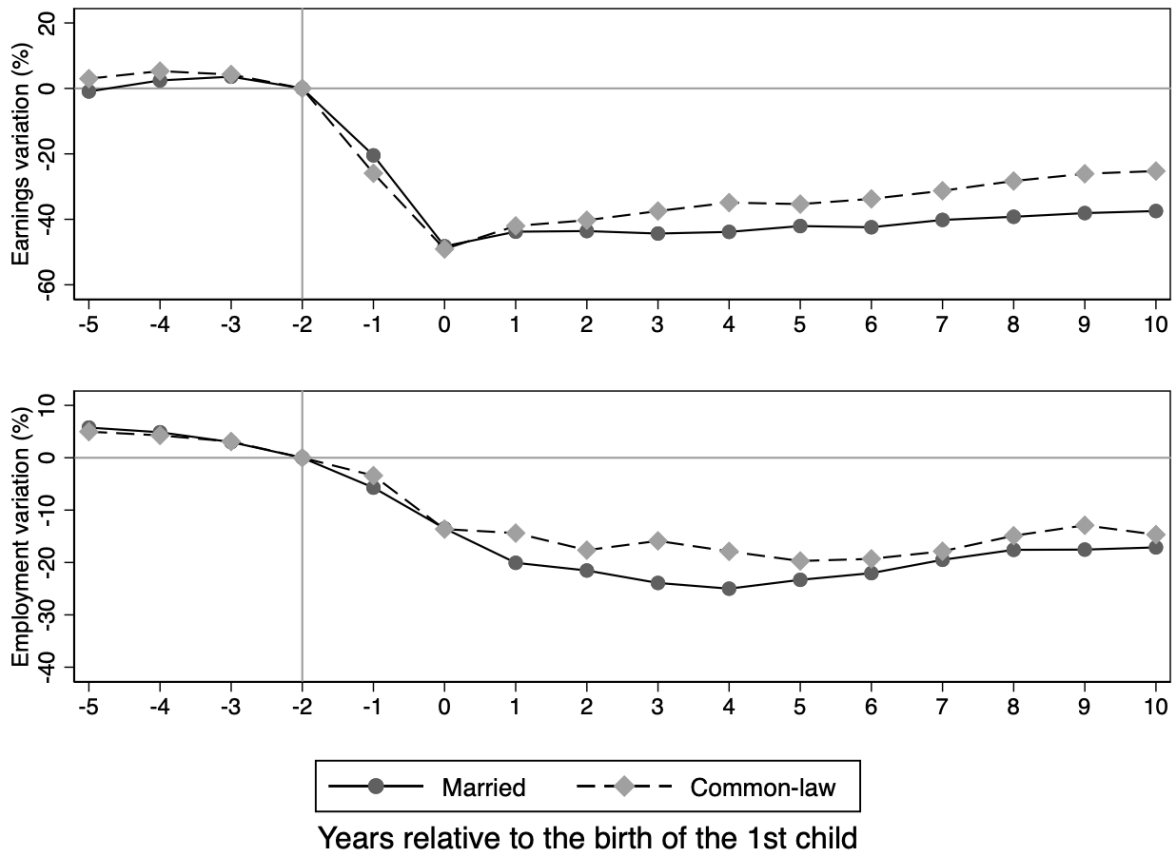
6.2. Estimated impact of children for different groups of mothers

We now focus entirely on mothers, and show how earnings and employment trajectories around the birth of the first child vary for different subgroups of mothers. Figures 2, 3 and 4 all follow the same pattern, presenting the effect of children for subsamples of mothers, with effects on earnings shown on the top panel and those on employment on the bottom panel. In practice, we estimate Equation (1) with a full set of interactions; this is equivalent to estimating on separate subsets of the data. We do not show confidence intervals on those figures, because even 90% confidence intervals usually overlap, making the figures harder to read. This reflects a limit of our analysis: due to relatively small sample sizes, we often cannot rule out that the observed trajectories are statistically equivalent. Our findings are thus reflective of general patterns, but statistical significance would need to be determined using a database with a larger number of observations.

We start in Figure 2 by splitting the sample according to whether the mothers were married at the time of the birth of the first child or living in a common law partnership. As we have seen in Table 1, an emerging phenomenon is the large and growing proportion of couples choosing to live in such a partnership rather than marry, especially in Québec. The top and bottom panels of Figure 2 show that the two groups have similar trajectories in both earnings and employment prior to the birth of the first child. At $\tau = 0$, the year of the birth, the impact of children are also similar for both groups. In the subsequent years, however, trajectories diverge somewhat, with mothers in common law partnerships having smaller negative effects both in employment and in earnings. This is coherent with a situation in which mothers in common law partnerships are more active on the labour market than married mothers, possibly because marital status itself impacts women's behaviour, but also

because characteristics which are unobservable yet correlated with marital status influence this association. Moreover, married women have more children, which may influence their participation in the labour market.[9]

Figure 2: Earnings and employment trajectories for mothers by marital status



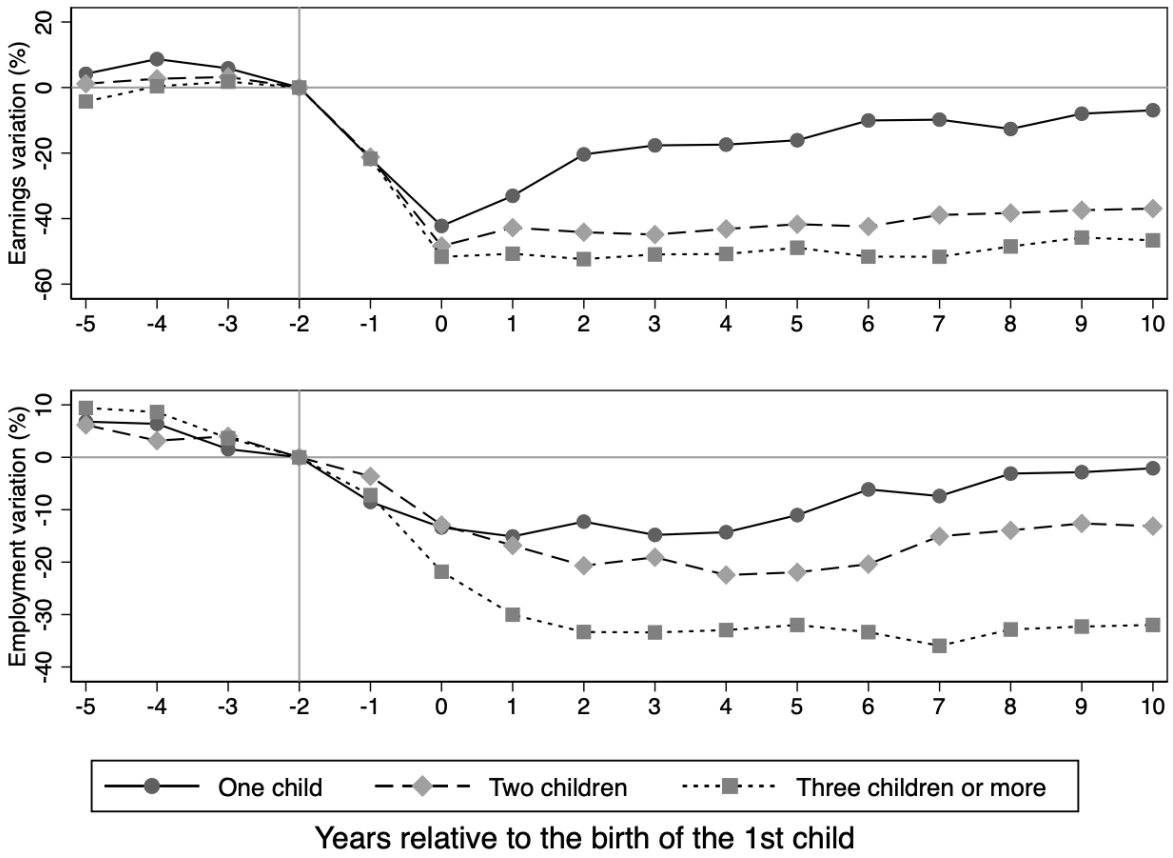
Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019)
Note: The values shown on the y-axis correspond to changes as a percentage based on estimated coefficients in the base model. The results are weighted using the sampling weights provided by Statistics Canada. Top panel shows variations in earnings; bottom panel shows variables in annual employment.

Another dimension that can influence personal trajectories is the number of children. As mentioned earlier, the long-term effect measures the total effect of children, including the

[9] In our sample, the average number of children of married women is 1.88, while for women living in common law partnerships it is 1.67.

effect of other children arriving at different moments in time following the birth of the first child. The number of children may be an important factor in the decision to return to the labour market. As Figure 3 shows, the negative impact of motherhood on both earnings and employment increases with the number of children.

Figure 3: Earnings and employment trajectories for mothers by number of children



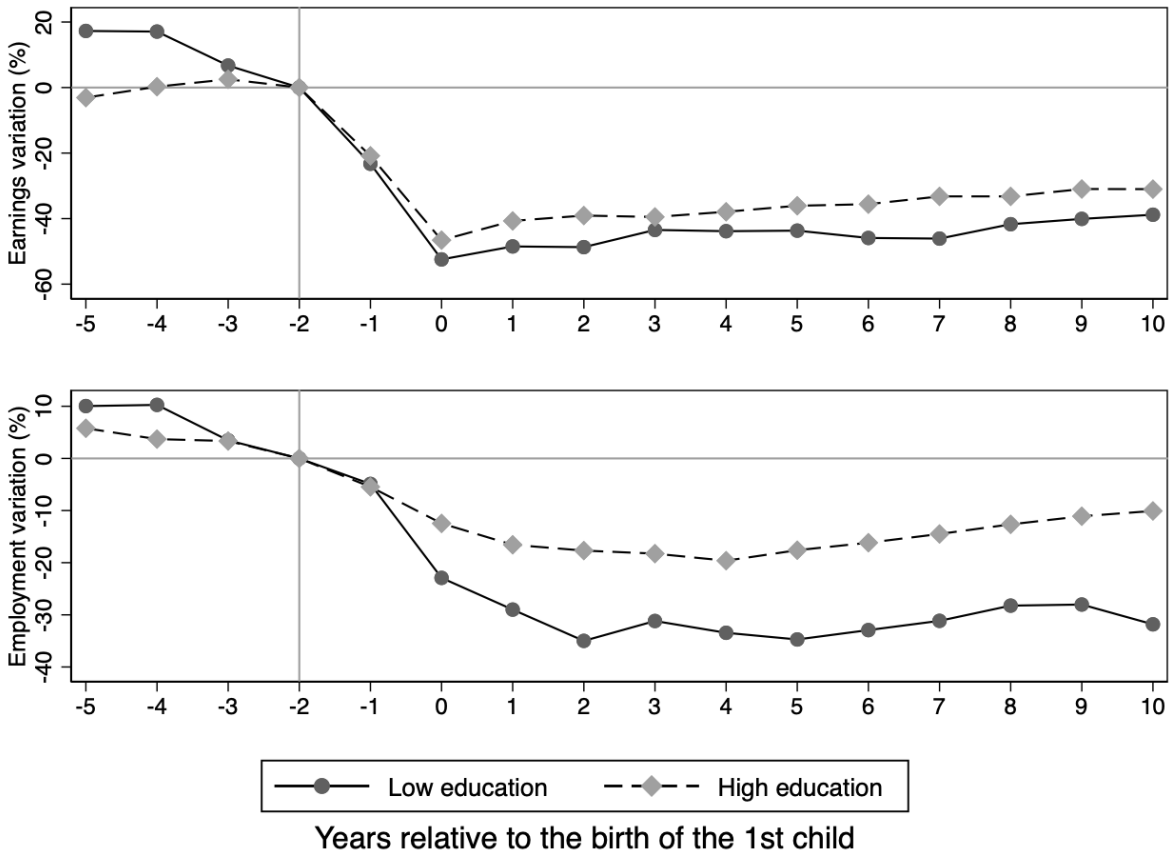
Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019)
Note: The values shown on the y-axis correspond to changes as a percentage based on estimated coefficients in the base model. The results are weighted using the sampling weights provided by Statistics Canada. Top panel shows variations in earnings; bottom panel shows variables in annual employment.

More specifically, while pre-child birth trajectories and variations on the year of the first child birth are similar for the different subgroups, mothers with only one child see the effect of children go to almost zero by the time their child is 10 years old. By that point, the variations relative to $\tau = -2$ are -6.9% (in earnings) and -2.1% (in employment) for

mothers with one child, compared to variations of −36.9% and −13.1% for those with two children, and −46.6% and −32.0% for those with three or more children. The effect of motherhood thus appears to be cumulative with respect to the number of children, with mothers of multiple children being affected negatively for much longer periods than those limited to one child. This pattern is in line with the findings of Karademir et al. (2023).

Finally, we investigate heterogeneity by education level. In Figure 4, we present earnings and employment variations relative to two years before the birth of the first child by whether the mother has a low level of educational attainment (high school diploma or less) or a high level (more than high school). We can see that negative impacts are larger for mothers with a low level of education, and that the differences between the two groups are especially pronounced when considering effects on employment. Indeed, while highly educated mothers have earnings variations that are between 2 to 13 percentage points smaller than mothers with a most a high school diploma, the gaps in employment variations range from 10 to 22 percentage points. Ten years after the birth of the first child, mothers with low education have employment levels 31.8% lower than two years before the birth, and the corresponding figure for highly educated mothers is 10.1%. It is worth repeating, however, that our estimates are imprecise due to the relatively low number of observations, and that consequently none of the differences between subgroups that we just presented are statistically significant. However, we believe our findings are indicative of patterns that merit further investigation with a dataset that would yield more precise estimates. To summarize our findings in this section, we find that mothers that are married, that have multiple children, and a low level of education display the largest negative impact of motherhood, on both earnings and employment.

Figure 4: Earnings and employment trajectories for mothers by education level



Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019)
Note: The values shown on the y-axis correspond to changes as a percentage based on estimated coefficients in the base model. The results are weighted using the sampling weights provided by Statistics Canada. Top panel shows variations in earnings; bottom panel shows variables in annual employment.

6.3 Effects of family policies on child penalties

In this subsection, we present suggestive evidence coming from a difference-in-differences approach used to distinguish the effect of the parental leave reform from that of Québec's daycare services reform. Figure 5 presents the trajectories of variations in mothers' earnings (top panel) and employment (bottom panel), with our sample split into four groups: mothers who lived in Québec at the time of the birth of the first child (series marked by blue triangles) and those who lived in the rest of Canada (red circles), each divided by whether the first child was born in 2000 or before (full lines) or in 2001 and later (dashed lines).

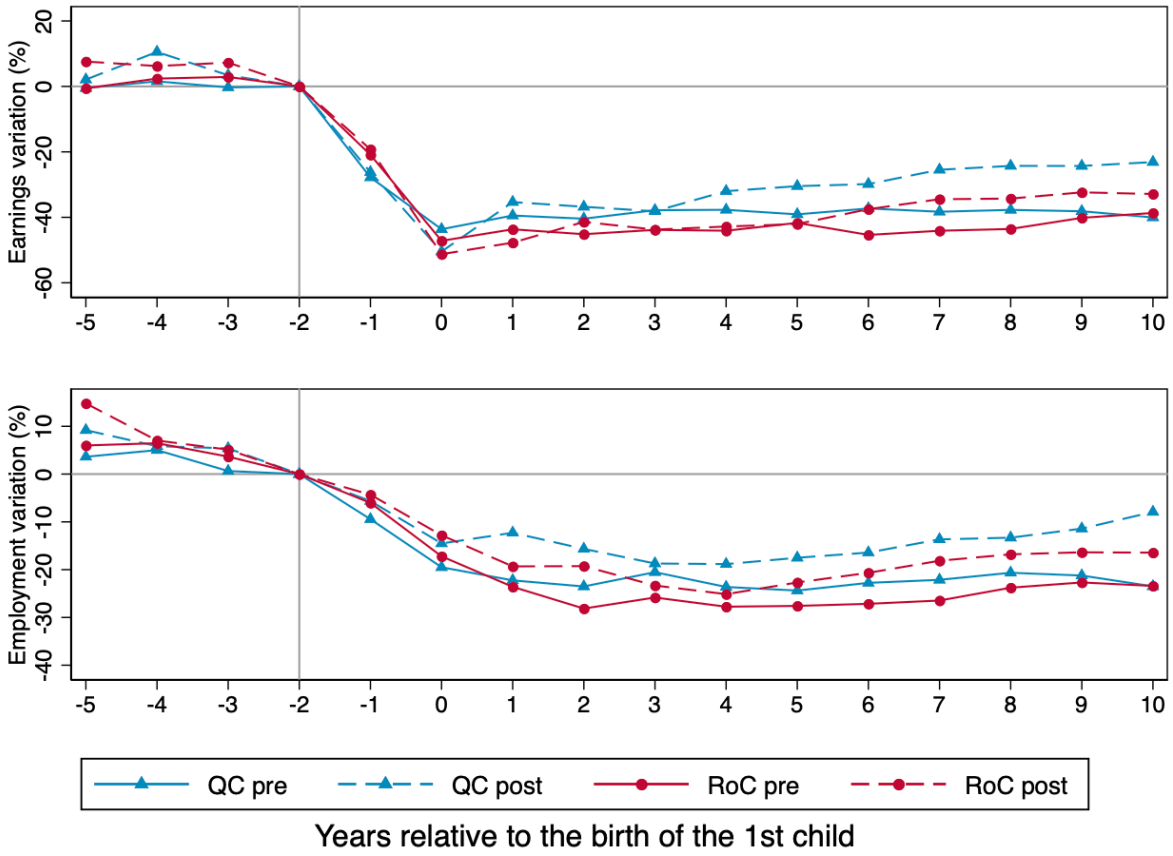
We start by focusing on mothers from the rest of Canada, to assess the effect of the parental leave reform on child penalties. The pre and post earnings trajectories of mothers in the rest of Canada follow a parallel trend, and both sharply fall on the year of the birth, but slightly less so for births in the pre period (-47% compared to -51% in the post period). Over the long term, i.e., ten years after the birth, mothers in other provinces who had their first child before 2001 display a negative impact of 39%, whereas those whose first child was born in 2001 or later are penalized by about 33%, a decrease of 6 percentage points. When considering employment (bottom panel), a similar pattern can be observed, although the post-2001 curve is always above the pre-2001, meaning that the losses in employment are always smaller after the parental leave reform, consistent with findings in Baker & Milligan (2008). Ten years out, the negative effects of children on employment are 23% and 16% for the pre and post periods, respectively, a difference of 7 percentage points. Although they never recover their prebirth earnings or employment levels, Canadian mothers outside Québec regain more ground and remain more attached to the labour force in the post period. The more generous federal parental leave program may have led to better job continuity post birth.

Comparing the situation in Québec with that of the rest of Canada allows us to provide suggestive evidence on the effect of the subsidized childcare program (on top of that of the federal parental leave reform). The top panel of Figure 5 shows that the situation of Québec mothers before 2001 was comparable with those from the rest of Canada, but that their earnings variations changed starting in 2000 relative to women in the rest of Canada. By the fifth year after the birth, the difference between mothers in post-reform Québec and other groups becomes larger, with mothers having recovered part of the lost earnings. Ten years after the birth, mothers in Québec who had their first child before 2001 display a negative effect of children in the order of 40%, whereas those whose first child was born in 2001 or later are penalized by about 23%, a decrease of 17 percentage points. A simple difference-in-differences calculation yields an effect on the effect of children on earnings of 11 percentage points (17 points in Québec compared to 6 in the rest of Canada).

In terms of employment trajectories (bottom panel of Figure 5), the pre/post patterns for Québec mothers are similar to those for the rest of Canada: the post-2001 curve is above

that of the pre-2001 curve, meaning smaller variations in employment in the post period. After 10 years, employment for mothers in Québec is down 23% during the pre period, but only 8% in the post period, a difference of 15 percentage points. When we compare this gain with that from the rest of Canada (7 percentage points), we infer a difference-in-differences estimate of 8 percentage points.

Figure 5: Earnings and employment trajectories for mothers by province of residence at birth and time



Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019)
Note: The values shown on the y-axis correspond to changes as a percentage based on estimated coefficients in the difference-in-differences model. The results are weighted using the sampling weights provided by Statistics Canada. Top panel shows variations in earnings; bottom panel shows variables in annual employment.

There are important limits to our interpretation. As previously mentioned, the confidence intervals are not shown because they overlap, making the figures hard to read.

We are therefore not able to claim that the differences highlighted in the previous paragraphs are statistically significant. The small number of observations in the LISA greatly limits our ability to make strong statements, but our results suggest that Québec's family policies helped reduce the negative effects of children on earnings by around 11 percentage points and those on employment by 8 percentage points. For a more definitive answer, a dataset with more observations is needed. This is precisely what Karademir et al. (2023) offer, by studying the multigenerational impact of subsidized childcare using the Longitudinal Administrative Databank (LAD), which contains millions of observations. They find that Québec's family policies seem to have helped reduce penalties in employment 10 years after the birth of the first child by at least 6.1 percentage points on average (see Karademir et al. (2023), Figures A17 and C3). These results are coherent with ours and with previous studies on the impact of the childcare policy on labour force participation (Lefebvre & Merrigan, 2008; Baker et al., 2008). However, it is important to remind ourselves that the changes between the trajectories of Québec mothers before and after 2001 are potentially influenced by both low-fee childcare and the improved parental leave program.

7. Conclusion

To summarize, we began with a database that includes a longitudinal study coupled with historical administrative records covering the period from 1982 to 2018 to analyze the effect of the arrival of children on the long-term earnings and employment trajectories of mothers and fathers separately. By using the same estimation strategy as Kleven et al. (2019a), we found the mothers' earnings fall drastically following the birth of the first child, with the average decrease for the year of birth estimated at about 49%. Over the long term, i.e., 10 years after the birth, Canadian women continue to earn less than they did before the birth of their first child and less than fathers, with the average penalty estimated at 34.3%. A similar pattern is found when considering employment instead of earnings, but with smaller penalties, and a long-run penalty of 14.2%, a number that is close to the employment penalty estimated using data on Denmark (Kleven et al., 2019a).

The arrival of children results in large losses that are not equally distributed within couples. Fathers do not appear to be adversely affected by children in terms of earnings and employment, whereas women experience penalties that persist over the long term, and especially mothers of multiple children or those with a low level of education. This impoverishment triggered by the birth of the first child could have significant economic impacts should the couple separate (Belleau et al., 2023).

In this context, it appears crucial to concentrate on measures that could eliminate or at least reduce the economic impact associated with family responsibilities on mothers' earnings and employment. To investigate such potential measures, we presented suggestive evidence on the effect of family policies designed to encourage maternal employment and promote more equal sharing of parenting responsibilities between partners starting in 2001, specifically the extension of parental leaves in Canada and the introduction of reduced-contribution daycare services for families in Québec. Using a difference-in-differences model, we found that Québec mothers were able to recover pre-birth levels of earnings and employment more quickly than mothers in the rest of Canada. The effect of Québec's family policies is potentially considerable: the long-term earnings gap, i.e., ten years after the birth of the first child, was reduced by 17 percentage points in Québec, from –40% to −23%. In comparison, the gap for women in the rest of Canada dropped from –39% to –33%, which is clearly an improvement but not in the same order of magnitude as the progress observed in Québec. The net effect of Québec's family policies on earnings may therefore be around 11 percentage points. For employment, we find a similar pattern, resulting in an estimated effect of 8 percentage points.

This study highlights the importance of continuing to work on developing more inclusive family policies that could reduce the child penalties. Of particular concern are mothers with a low level of education and multiple children. However, this would need to be done without neglecting the quality of services offered for children, such as a quality education program in daycare services. Haeck et al. (2018) and Baker et al. (2019) agree that the introduction of reduced-contribution daycare services has, on average, not had positive long-term effects on children, and has had some short-term negative effects for preschool children. The quality of the daycare services network is generally low. In addition, the most

vulnerable children are less represented in high-quality daycares (Haeck et al., 2015). The network needs to improve its quality, especially in the most underprivileged sectors. These policies therefore have effects in several areas of people's lives. In the short term, policies have an impact on women joining and remaining in the labour force. Over the long term, women's earnings trajectories appear to be positively influenced by these policies, which serves to reduce the gap between men and women. It should be noted that this study did not undertake a cost–benefit analysis that would allow us to compare the costs of implementing such measures with their benefits.

As Goldin (2014) highlighted, the solution may not necessarily take the form of government intervention but may involve changes to the labour market. In particular, the way in which jobs are structured and valued on the labour market needs to be re-examined. Nowadays, both men and women want to spend quality time with their children, and a compensation model that allows for some flexibility therefore needs to be developed.

Finally, while it takes two to conceive a child, many couples eventually face a relationship breakdown. In Canada, as in Québec, nearly one third of marriages end in divorce (Statistics Canada, 2022b; Ministère de la Famille, 2023). In this context, it would be interesting to analyze, in a future study, the effect of changes in marital status on post-birth earnings and employment trajectories. Indeed, literature on this topic again indicates that it is women who are financially disadvantaged following a separation (Le Bourdais et al., 2016; Belleau et al., 2023). The situation may be attributable to pre-separation factors such as the unequal division of labour during the marriage and lower earnings for women, but also to women's prolonged absences from the labour force due to family responsibilities.

In addition to having a positive effect on the economic situation of women, encouraging employment for mothers could also contribute to eliminating the stigma around the division of labour within couples by specifically exposing children to a more symmetrical model of remunerated and unpaid work. A recent study showed that active mothers are more likely to transmit egalitarian values to their children both at work and at home. McGinn et al. (2019) analyzed the relationship between mothers' employment and their children's behaviour when they become adults using data from 29 countries. They found that girls who had

mothers who are employed ended up working more themselves than girls whose mothers did not work outside the home. Specifically, they worked more hours, were better paid and held supervisory positions more often than girls with stay-at-home mothers. This result was not observed in boys. However, boys who grew up with employed mothers were more involved in family and domestic responsibilities than were men whose mothers were not in the labour market. The girls also spent less time doing household chores. We can therefore conclude that mothers in the workforce appear to have an intergenerational impact favouring gender equality both within the family unit and on the labour market.

References

Anderson, D. J., Binder, M., & Krause, K. (2002). The Motherhood Wage Penalty: Which Mothers Pay It and Why? *American Economic Review, 92*(2), 354-358.

Angelov, N., Johansson, P. & Lindahl, E. (2016). Parenthood and the Gender Gap in Pay. *Journal of Labor Economics, 34*(3), 545-579.

Baker, M., & Milligan, K. (2008). How does Job-protected Maternity Leave Affect Mothers' Employment?. *Journal of Labor Economics*, *26*(4), 655-691.

Baker, M., & Milligan, K. (2010). Evidence from Maternity Leave Expansions of the Impact of Maternal Care on Early Child Development. *Journal of Human Resources, 45*(1), 1-32.

Baker, M., Gruber, J., & Milligan, K. (2008). Universal Childcare, Maternal Labor Supply, and Family Well-Being. *Journal of Political Economy, 116*(4), 709-745.

Baker, M., Gruber, J., & Milligan, K. (2019). The Long-Run Impacts of a Universal Child Care Program. *American Economic Journal: Economic Policy, 11*(3), 1-26.

Bauernschuster, S., & Schlotter, M. (2015). Public Child Care and Mothers' Labor Supply - Evidence from Two Quasi-Experiments. *Journal of Public Economics, 123*, 1-16.

Belleau, H., Connolly, M., Fontaine, M. M., Goussé, G., & Lévesque, S. (2023). Répercussions économiques des ruptures conjugales. In M.-C. Saint-Jacques, C. Robitaille, E. Godbout, A. Baude, & S. Lévesque (Eds.), *L'expérience de la séparation parentale et de la recomposition familiale dans la société québécoise*, (chap. 5, pp. 147–169). Presses de l'Université Laval.

Berlinski, S., & Galiani, S. (2007). The Effect of a Large Expansion of Pre-Primary School Facilities on Preschool Attendance and Maternal Employment. *Labour Economics, 14*(3), 665-680.

Bettendorf, L. J. H., Jongen, E. L. W., & Muller, P. (2015). Childcare subsidies and labour supply — Evidence from a large Dutch reform. *Labour Economics, 36*, 112-123.

Blau, F. D., & Kahn, L. M. (2003). Understanding International Differences in the Gender Pay Gap. *Journal of Labor Economics, 21*(1), 106-144.

Blau, F. D., & Kahn, L. M. (2017). The Gender Wage Gap: Extent, Trends, and Explanations. *Journal of Economic Literature, 55*(3), 789-865.

Bonikowska, A., Drolet, M. & Fortin, N. M. (2019) Earnings Inequality and the Gender Pay Gap in Canada: The Role of Women's Under-representation Among Top Earners, *Economic Insights,* Statistics Canada no. 11-626-X No. 088.

Budig, M. J. (2014). The Fatherhood Bonus & The Motherhood Penalty: Parenthood and the Gender Gap in Pay. Washington, DC: Third Way.

Budig, M. J., & England, P. (2001). The Wage Penalty for Motherhood. *American Sociological Review, 66*(2), 204-225.

Budig, M. J., & Hodges, M. (2010). Differences in Disadvantage: Variation in the Motherhood Penalty across White Women's Earnings Distribution. *American Sociological Review, 75*(5), 705-728.

Budig, M. J., Misra, J. & Boeckmann, I. (2016). Work–Family Policy Trade-Offs for Mothers? Unpacking the Cross-National Variation in Motherhood Earnings Penalties. *Work and Occupations, 43*(2), 119-177.

Cloutier-Villeneuve, L. (2018). Écarts de rémunération entre les femmes et les hommes au Québec : perspectives au regard des différences de composition de la main-d'œuvre. Institut de la statistique du Québec, Flash-info, *19*(1), March 2018.

Commission des normes, de l'équité, de la santé et de la sécurité du travail. (n.d.). *Pour une maternité sans danger : statistiques, 2013-2016*. https://www.cnesst.gouv.qc.ca/Publications/300/Documents/DC300-254web.pdf

Connolly, M., Fontaine, M. M., & Haeck, C. (2018). État des lieux sur les écarts de revenus entre les parents et les femmes et hommes sans enfant au Québec et dans le reste du Canada. Project Report 2018RP-07, CIRANO, Montréal.

Connolly, M., Fontaine, M. M., & Haeck, C. (2020). Les politiques familiales du Québec évaluées à partir des trajectoires de revenus d'emploi des parents et des personnes sans enfant. Project Report 2020RP-05, CIRANO, Montréal.

Cross-National Data Center in Luxembourg. (n.d.). https://www.lisdatacenter.org/

Dupuy, A., & Fernández-Kranz, D. (2011). International Differences in the Family Gap in Pay: the Role of Labour Market Institutions. *Applied Economics, 43*(4), 413-438.

Fernández-Kranz, D., Lacuesta, A., & Rodríguez-Planas, N. (2013). The Motherhood Earnings Dip: Evidence from Administrative Records. *Journal of Human Resources, 48*(1), 169-197.

Findlay, L. C., & Kohen, D. E. (2012). Leave Practices of Parents After the Birth or Adoption of Young Children. Component of Statistics Canada Catalogue no. 11-008-X, *Canadian Social Trends*, *94*. https://childcarecanada.org/sites/default/files/leave-parents-birth-adoption-2012.pdf

Fortin, N. M. (2019). Increasing Earnings Inequality and the Gender Pay Gap in Canada: Prospects for Convergence. *Canadian Journal of Economics / Revue Canadienne d'Économique, 52*(2), 407-440.

Givord, P., & Marbot, C. (2015). Does the cost of child care affect female labor market participation? An evaluation of a French reform of childcare subsidies. *Labour Economics, 36*, 99-111.

Glauber, R. (2007). Marriage and the Motherhood Wage Penalty Among African Americans, Hispanics, and Whites. *Journal of Marriage and Family, 69*(4), 951-961.

Goldin, C. (2014). A Grand Gender Convergence: Its Last Chapter. *American Economic Review, 104*(4), 1091-1119.

Government of Canada. (n.d.). EI maternity and parental benefits. What these benefits offer. https://www.canada.ca/en/services/benefits/ei/ei-maternity-parental.html

Government of Québec. (n.d.). Régime québécois d'assurance parentale. https://www.rqap.gouv.qc.ca/fr

Grimshaw, D., & Rubery, J. (2015). The Motherhood Pay Gap. A Review of the Issues, Theory and International Evidence. Working Paper No. 1/2015, Gender, Equality and Diversity Branch, Organisation internationale du Travail, Genève.

Haeck, C., Lefebvre, P., & Merrigan, P. (2015). Canadian Evidence on Ten Years of Universal Preschool Policies: The Good and the Bad. *Labour Economics, 36*, 137-157.

Haeck, C., Lebihan, L., & Merrigan, P. (2018). Universal Child Care and Long-Term Effects on Child Well-Being: Evidence from Canada. *Journal of Human Capital, 12*(1), 38-98.

Haeck, C., Paré, S., Lefebvre, P., & Merrigan , P. (2019). Paid Parental Leave: Leaner Might Be Better. *Canadian Public Policy, 45*(2), 212-238.

Harkness, S., & Waldfogel, J. (2003). The Family Gap in Pay: Evidence From Seven Industrialized Countries. *Research in Labor Economics* (*Worker Well-Being and Public Policy*)*, 22*, 369-413.

Havnes, T., & Mogstad, M. (2015). Is Universal Child Care Leveling the Playing Field? *Journal of Public Economics, 127*, 100-114.

Hill, M. S. (1979). The Wage Effects of Marital Status and Children. *The Journal of Human Resources, 14*(4), 579-594.

Human Resources and Skills Development Canada. (2005). Summative Evaluation of EI Parental Benefits. Government of Canada, Human Resources and Skills Development Canada. SP-AH-674-01-05E.

Institut de la statistique du Québec (2018). La mortalité et l'espérance de vie au Québec en 2017. Coup d'œil sociodémographique, *66*, (Mai). http://www.stat.gouv.qc.ca/statistiques/population-demographie/bulletins/coupdoeil-no66.pdf

International Social Survey Programme. (n.d.). http://w.issp.org/menu-top/home/

Jacobsen, J. P., Pearce, J. W. III, & Rosenbloom, J. L. (1999). The Effects of Childbearing on Married Women's Labor Supply and Earnings: Using Twin Births as a Natural Experiment, *Journal of Human Resources*, *34*(3), 449-474.

Joshi, H., Paci, P., & Waldfogel, J. (1999). The Wages of Motherhood: Better or Worse? *Cambridge Journal of Economics, 23*(5), 543-564.

Karademir, S., Laliberté, J.-W., & Staubli, S. (2023), The Multigenerational Impact of Children and Childcare Policies. IZA Discussion Papers No. 15894, Institute of Labor Economics (IZA).

Kellewald, A., & Bearak, J. (2014). Is the Motherhood Penalty Larger for Low-Wage Women? A Comment on Quantile Regression. *American Sociological Review, 79*(2), 350-357.

Kleven, H. (2022). The geography of child penalties and gender norms: Evidence from the United States. NBER Working Paper No. 30176. National Bureau of Economic Research.

Kleven, H., Landais, C., Posch, J., Steinhauer, A., & Zweimüller, J. (2019b). Child Penalties across Countries: Evidence and Explanations. *AEA Papers and Proceedings*, *109,* 122-126.

Kleven, H., Landais, C., Posch, J., Steinhauer, A. & Zweimüller, J. (2022). Do Family Policies Reduce Gender Inequality? Evidence from 60 Years of Policy Experimentation. NBER Working Paper No. 28082. National Bureau of Economic Research.

Kleven, H., Landais, C., & Søgaard, J. E. (2019a). Children and Gender Inequality: Evidence from Denmark. *American Economic Journal : Applied Economics*, *11*(4), 181-209.

Kleven, H., Landais, C., & Søgaard, J. E. (2021). Does biology drive child penalties? evidence from biological and adoptive families. *American Economic Review: Insights*, *3*(2), 183-98.

Kunze, A., & Liu, X. (2019). Universal Childcare for the Youngest and the Maternal Labour Supply. IZA Discussion Papers, No. 12146, Institute of Labor Economics (IZA), Bonn.

Kuziemko, I., Pan, J., Shen, J., & Washington, E. (2018). The Mommy Effect: Do Women Anticipate the Employment Effects of Motherhood? NBER Working Paper No. 24740. National Bureau of Economic Research.

Le Bourdais, C., Jeon, S. H., Clark, S., & Lapierre-Adamcyk, É. (2016). Impact of Conjugal Separation on Women's Income in Canada: Does the Type of Union Matter? *Demographic Research*, *35*(50), 1489–1522.

Lefebvre, P., & Merrigan, P. (2008). Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada. *Journal of Labor Economics, 26*(3), 519-548.

Lefebvre, P., Merrigan, P., & Verstraete, M. (2009). Dynamic Labour Supply Effects of Childcare Subsidies: Evidence from a Canadian Natural Experiment on Low-Fee Universal Child Care. *Labour Economics, 16*(5), 490-502.

Lundberg, S., & Rose, E. (2000). Parenthood and the Earnings of Married Men and Women. *Labour Economics, 7*(6), 689-710.

Marshall, K. (2003). Benefiting from extended parental leave*. Perspectives*, *4*(3), Statistics Canada — Catalogue no. 75-001-XIE. https://www150.statcan.gc.ca/n1/en/pub/75-001-x/00303/6490-eng.pdf?st=1d1KWKST

McGinn, K., Ruiz Castro, M., & Long Lingo, E. (2019). Learning from Mum: Cross-National Evidence Linking Maternal Employment and Adult Children's Outcomes. *Work, Employment and Society, 33*(3), 374-400.

McKay, L., Mathieu, S., & Doucet, A. (2016). Parental-Leave Rich and Parental-Leave Poor: Inequality in Canadian labour Market Based Leave Policies. *Journal of Industrial Relations, 58*(4), 543-562.

Miller, A. R. (2011). The Effects of Motherhood Timing on Career Path. *Journal of Population Economics, 24*(3), 1071-1100.

Mincer, J., & Polachek, S. (1974). Family Investment in Human Capital: Earnings of Women. *Journal of Political Economy, 82*(2), S76-S108.

Ministère de la Famille. (n.d.). http://www.bdso.gouv.qc.ca/docs-ken/vitrine/occupation-vitalite-territoire/documents/services_proximite_02.pdf

Ministère de la Famille (2023). La séparation parentale après l'arrivée d'un premier enfant. Quelques tendances démographiques au fil du temps et des générations au Québec. *Bulletin Quelle famille ?, 10*(1), 11 pages.

Misra, J., Budig, M., & Boeckmann, I. (2011). Work-Family Policies and the Effects of Children on Women's Employment Hours and Wages. *Community, Work & Family, 14*(2), 139-157.

Olivetti, C., & Petrongolo, B. (2017). The Economic Consequences of Family Policies: Lessons from a Century of Legislation in High-Income Countries. *Journal of Economic Perspective, 31*(1), 205-230.

Phipps, S., Burton, P., & Lethbridge, L. (2001). In and out of the Labour Market: Long-Term Income Consequences of Child-Related Interruptions to Women's Paid Work. *The Canadian Journal of Economics / Revue canadienne d'économique, 34*(2), 411-429.

Rønsen, M., & Sundström, M. (2002). Family Policy and After-Birth Employment Among New Mothers – A Comparison of Finland, Norway and Sweden. *European Journal of Population / Revue européenne de Démographie, 18*(2), 121-152.

Srivastava, A., & Rodgers, W. M. (2013). The Motherhood Wage Gap for U.S. First-Generation Immigrant and Native Women. National Poverty Center working paper series, no. 13–08.

Statistics Canada (2014), Longitudinal and International Study of Adults (LISA) [microdata], Wave 1, dataset accessed at the Quebec Interuniversity Centre for Social Statistics.

Statistics Canada (2016), Longitudinal and International Study of Adults (LISA) [microdata], Wave 2, dataset accessed at the Quebec Interuniversity Centre for Social Statistics.

Statistics Canada. (2018). Fertility: Fewer children, older moms. Canadian Megatrends. Catalogue no. 11-630-X. https://www150.statcan.gc.ca/n1/pub/11-630-x/11-630-x2014002-eng.htm

Statistics Canada. (2022a). Table 13-10-0416-01. Live births, by age of mother. DOI: https://doi.org/10.25318/1310041601-eng

Statistics Canada. (2022b). Table 39-10-0051-01. Number of divorces and divorce indicators. DOI: https://doi.org/10.25318/3910005101-eng

Statistics Canada. (2023). Table 17-10-0009-01. Population estimates, quarterly. DOI: https://doi.org/10.25318/1710000901-eng

Takser L. (2013). 'Pregnant pause': the need for an evidence-based approach for work leave in the prevention of preterm birth and low birthweight. *BJOG*, *120*(5), 517-20. DOI: 10.1111/1471-0528.12061.

Waldfogel, J. (1995). The Price of Motherhood: Family Status and Women's Pay in a Young British Cohort. *Oxford Economic Papers, 47*(4), 584-610.

Waldfogel, J. (1997). The Effect of Children on Women's Wages. *American Sociological Review, 62*(2), 209-217.

Waldfogel, J. (1998). Understanding the "Family Gap" in Pay for Women with Children. *The Journal of Economic Perspectives, 12*(1), 137-156.

White, R. M. (2019). There and Back Again – The Performance Evaluation Effects of Going to and Returning from Part-Time Status. https://dx.doi.org/10.2139/ssrn.2911397

Zhang, X. (2010). Can Motherhood Earnings Losses Be Ever Regained? Evidence From Canada. *Journal of Family Issues, 31*(12), 1671-1688.

Appendix

Appendix Table 1: Sociodemographic characteristics of fathers who gave birth to their first child before and after 2001, in Québec and in the rest of Canada

	Québec		Rest of Canada	
	Pre reform	**Post reform**	**Pre reform**	**Post reform**
Sociodemographic characteristics				
Median year of birth	1962	1974	1963	1973
Born in Canada	0.91	0.87	0.80	0.74
Family characteristics				
Age at the time of the first birth	30.6	31.0	29.9	31.7
	(5.9)	(6.5)	(9.0)	(8.1)
Number of children (continuous)	2.08	2.15	2.39	2.12
	(1.22)	(0.92)	(2.26)	(1.11)
Number of children (dummies)				
One child	0.27	0.20	0.17	0.21
Two children	0.48	0.51	0.49	0.56
Three children or more	0.25	0.29	0.35	0.24
Marital status at $\tau = 0$				
Married	0.48	0.21	0.74	0.75
Common-law partner	0.28	0.71	0.05	0.13
Separated/divorced/widowed/single	0.24	0.08	0.21	0.13
Education				
Years of education (continuous)	14.2	15.0	14.5	15.3
	(5.3)	(4.7)	(5.0)	(4.7)
Highest diploma (dummies)				
No diploma	0.08	0.09	0.09	0.06
Secondary diploma	0.18	0.15	0.22	0.16
Post-secondary diploma	0.45	0.40	0.40	0.35
University diploma	0.28	0.36	0.29	0.43
N (Fathers-years)	4,900	2,800	17,600	7,600
N (Fathers)	300	200	1,200	500

Source: Calculations made by the authors using LISA data (2012; 2014) and T1 forms (1982–2019).

Note: Except for the median year of birth, the numbers in the table are averages, weighted with the sampling weights provided by Statistics Canada. Standard deviations for continuous variables are displayed in parentheses. Number of observations rounded to the closest hundred to respect Statistics Canada's disclosure rules.