How Infant Health Shapes Maternal Earnings *

Abdel-Hamid Bello†

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Abstract

This paper investigates whether children born at low birth weight or prematurely have a ripple effect on the mother's earnings trajectory. I exploit rich administrative data linking mothers' tax records to their children's birth certificates in Canada. Comparing similar mothers in terms of pre-birth outcomes, I find an increasing penalty of child health on earnings from birth to school entry age. This penalty tends to increase income inequalities between mothers and the gender pay gap within households. The results suggest that the persistence of the penalty is in part due to poor health during childhood and the physical or mental stress put on mothers. (**JEL J13, J22, I14**)

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†Department of Economics, Université Laval. *Email:* *abdel-hamid.bello.1@ulaval.ca*

1 Introduction

Gender inequality in the labor market is largely impacted by parenthood related disruptions (Kleven et al., 2019). Understanding the sources of heterogeneity in the impact of childbirth on maternal labor force outcomes is thus key to designing policies aimed at reducing economic gender gap. While childcare and maternal leave policies have eased some of the burden, persistent gender differences in incomes, employment and promotions suggest that these efforts may not fully address the challenges mothers face.[1] An underexplored source of heterogeneity may lie in children's health outcomes at birth. If poor infant health exacerbates the motherhood penalty by increasing caregiving demands, interventions to improve maternal and child health could also help reduce gender inequality. However, the extent to which this could be the case depends on the relationship between a child's health at birth and his mother's earnings trajectory.

This paper sheds some light on this relationship. Specifically, I focus on the impact of low birth weight (below 2,500 grams) and preterm births (before 37 weeks) on maternal earnings in the decade following the pregnancy. These health conditions are correlated with poorer childhood and adulthood outcomes (e.g., Aarnoudse-Moens et al., 2009; Eeles et al., 2022; Wehby, 2022; Royer, 2009), and could influence parents' labor market outcomes. Since mothers typically assume a larger share of childcare, children's health at birth may disproportionately influence maternal labor force participation and income over time.

As I find that poor infant health negatively influence maternal earnings in the years after birth, my results inform on the potential causal link between in utero health shocks, child health, and maternal economic outcomes. Unlike health in adulthood, where the timing of exposure to the causal pathogen is often unknown, health at birth is directly linked to the in utero period. Supporting this fact, studies have linked health at birth and children long-term outcomes to in utero conditions including policy relevant issues, such as exposure to air pollution (e.g., Currie and Walker 2011) or even more modifiable behaviors such as smoking or alcohol consumption during pregnancy (e.g., Bharadwaj et al., 2014; von Hinke Kessler Scholder et al., 2014).[2] Therefore, assessing the importance of health at birth on the trajectory of maternal earnings may help uncover another possible channel through which

[1] For example, Baker et al. (2008) and Connolly et al. (2023) find that loss in employment for women due to a child's birth is lower in post parental leave reform in Canada. Baum and Ruhm (2016) and Rossin-Slater et al. (2013) find that paid family leave increases employment for mothers after birth in California.

[2] The literature is often referred to as the *fetal origin hypothesis* literature (Barker 1990).

these often preventable health shocks can influence social well-being.

Studying the impact of infant health on maternal earnings presents two main challenges. First, it requires large-scale, longitudinal data covering mothers' earnings both before and after childbirth, as well as detailed information on birth outcomes. Second, constructing appropriate counterfactuals is crucial, as mothers of healthy and unhealthy newborns may differ in ways that also affect their income trajectories (e.g., Aizer and Currie, 2014). For example, wealthier or more educated mothers are more likely to access prenatal care, which positively influences birth outcomes (e.g., Currie and Moretti, 2003). To address these challenges, I use unique administrative data on birth outcomes in Canada from 2006 to 2015, linked to annual family tax files.[3] The longitudinal nature of the tax files makes it possible to construct a sample of mothers followed from four years before to seven years after the birth of their child. In addition, the availability of individual labor income, individual and family total income, and tax credit for children and mothers' own disability enables one to explore the effect of children's health at birth on the family's economic dynamic and channels through which this effect may occur.

To estimate the impact of infant health on maternal earnings trajectories (the infant health penalty), I employ a research design that combines matching and event study approaches. Specifically, I implement a two-step matching approach similar to the within-block matching described by Rubin and Thomas (2000).[4] First, I generate a set of control mothers with healthy newborns for each treated mother with a low-birth-weight or premature infant by matching exactly on key variables determining life cycle patterns and health history, such as first time motherhood and prior receipt of a disability tax credit. Next, I select the best match for each mother based, among other things, on similarity of average pre-birth income. Finally, I compare the trajectories of mothers of less healthy newborns and mothers of healthier newborns in the matched comparison group using an event study around the child's birth.

Empirical analyses reveal a persistent and growing infant health penalty. Mothers of low-birth-weight or preterm infants earn 1.64% less in labor income than mothers of healthier children one year after birth, and this gap increases to 3.53% by the time the child is seven. The likelihood of having zero earnings also rises for mothers of less healthy infants, suggesting

[3] To my knowledge, no equivalent dataset exist on another North American jurisdiction.
[4] Also known as block randomization in health intervention (Efird 2011).

that these children's health needs may push mothers out of the labor force. Looking at the mother's total income, I find that the effect of infant health is slightly lower, suggesting that transfers may be helping mothers compensate for some of the loss due to their child's condition at birth.

Although the penalty associated with having a low-birth-weight or premature infant appears modest, the findings suggest that it contributes to widening the gender pay gap within households and increasing income inequality among mothers. While the partners of affected mothers also experience some financial impact, the gender pay gap within households is enhanced by a child's poor health at birth. Specifically, mothers whose child is born in poor health are 3.43% less likely to earn at least 40% of total household income compared to mothers of healthier children, six years after birth. Additionally, these mothers are increasingly likely to fall into the bottom quartile of the calendar-year income distribution.

To explore whether generous family policies mitigate the infant health penalty, I compare outcomes across Canadian provinces. For example, Quebec's more generous parental leave policies appear to slightly reduce the penalty in the short term—within the first three years after birth—but have no measurable impact in the longer term (six or seven years post-birth). These findings align with previous literature suggesting that the benefits of parental leave policies tend to taper off after the first few years (e.g., Lalive and Zweimüller 2009; Rossin-Slater et al. 2013).

I also disentangle the effects of low birth weight and prematurity to determine which condition drives the penalty. The analysis reveals that low birth weight has a greater impact on maternal earnings than prematurity. Furthermore, I find that the low birth weight denomination does not give the whole picture. In fact, I find that the lighter the baby is, the lesser the mothers earnings will be. This suggests that interventions aimed at increasing birth weight—regardless of the baseline level—could improve maternal economic outcomes by reducing the caregiving burden in childhood.

Building on the literature on child penalty, I propose a simple static household decision model that suggests gender norms, childcare, and productivity shocks as potential mechanisms (Andresen and Nix, 2022). I find that mothers of less healthy infants are more likely to receive disability benefits or tax credits related to their child's and their own health, but these transfers explain less than 10% of the income penalty. This is probably due to the fact that this measure of health shock concerns serious health problems and does not take into account less serious daily health problems.[5] Performing a mediation analysis, I find that receiving a child disability benefit contribute more to the income penalty than receiving a tax credit for the mothers own disability. This suggests that caregiving demands, play the dominant role.

This paper is mainly related to the literature on the impact of children's health on their parents' economic outcomes (e.g., Porterfield 2002; Powers 2003; Corcnan et al. 2005; Frijters et al. 2009; Wasi et al. 2012; Burton et al. 2017; Zhu 2016). Most of those studies say very little about the dynamic effect of child health, mostly due to data limitation.[6] More recent papers draw on rich administrative data from Scandinavian countries to document the dynamic impact of children's health on parental income trajectories (e.g., Eriksen et al., 2021; Breivik and Costa-Ramón, 2024; Vaalavuo et al., 2023; Adhvaryu et al., 2023).[7] This paper contributes to this literature in two important ways. First, health problems in childhood may have originated from health endowments at birth. Investigating the dynamic effect of health at birth thus provides a clearer insight into the relationship between a stage of development of a child since birth and maternal earnings. Second, by focusing on low birth weight and prematurity of children, it can generate useful policy insights, since there are well-known preventive measures that can generally improve birth outcomes.[8]

To my knowledge, only one recent paper by Gunnsteinsson and Steingrimsdottir (2019) examines the effect of child health status from birth on maternal earnings. However, their definition of health problems is limited to very rare conditions such as cerebral palsy, blindness, and deafness.[9] In contrast, low birth weight and prematurity are associated with a much wider range of health complications beyond just chronic conditions in childhood. My

[5]In fact, only one in ten mothers of infants in poor health receive these benefits in the years following the child's birth.

[6]Zhu (2016) is an exception that finds a negative dynamic impact on labor supply for Australian mothers caring for a disabled infant or toddler, but its results are limited to two years after birth.

[7]Eriksen et al. (2021) leverage the quasi-randomness of type 1 diabetes and find that its diagnosis during childhood leads to a greater reduction in maternal labor supply during the year of diagnosis using Danish data; Breivik and Costa-Ramón (2024) find that maternal labor earnings experience a persistent decline following a sudden child hospitalization or death, irrespective of the underlying health problem in Norway and Finland; Vaalavuo et al. (2023) show that medium-term labor market outcomes following a child cancer diagnosis are greater for mothers than fathers in Finland; Adhvaryu et al. (2023) document a substantial decline in earnings for parents three to four years following a child's cancer diagnosis in Denmark.

[8]That is what justified the existence of program aims at improving prenatal conditions such as the Supplemental nutrition program for Women, Infant, and Children (WIC) in US and the Canada Prenatal Nutrition Program (CPNP) in Canada.

[9]Only 0.33% to 0.87% of children were affected in their sample, whereas more than 7% of births in Canada each year are low birth weight or preterm births, similar to the mean in OECD countries.

findings highlight this by reflecting the impact of both severe (e.g. mental retardation) and less severe (e.g. asthma) health conditions on mothers' earnings trajectories.[10]

This paper also relates to the literature on the child penalty (e.g., Angelov et al. 2016; Lundborg et al. 2017; Kleven et al. 2021; Artmann et al. 2022). By examining health at birth, this paper indirectly tests the role of parental care intensity as a mechanism for explaining the effects of childbirth on income.

In terms of the broader question, this study also contributes to the literature that examines the effects of spillover within families of infants with poor health (e.g., Daysal et al., 2022). I take a comprehensive approach by examining health at birth through both birth weight and gestational age, rather than focusing solely on birth weight as is often the case in existing research. This dual approach provides a nuanced understanding of the impact of early-life health shocks on family outcomes, helping to capture effects that may be missed when considering only one dimension of neonatal health.[11]

The remainder of the paper is structured as follows. Section 2 describes the empirical setting and the data. Section 3 presents the identification strategy. Section 4 estimates the impact of infant health. Section 5 explores the mechanisms. Section 6 presents the robustness checks. Section 7 considers the heterogeneity of the results, and finally Section 8 concludes the paper.

2 Context and data

2.1 Institutional setting

Canada is characterized by a generous social insurance system that offers a variety of supports to families, compensating families for income loss due to parental responsibilities, and helping parents achieve a work-life balance. While certain programs are uniformly implemented across provinces, others vary significantly from province to province. This heterogeneity within the same country provides a unique opportunity to examine how varying institutional contexts can influence the infant health penalty on families' income.

[10]For example, Eeles et al. (2022) find that birth weight is associated with the onset of disability at school entry age, while Sonnenschein-Van Der Voort et al. (2014) suggest an association between preterm births and low birth weight and the risk of asthma in childhood.

[11]For example, Daysal et al. (2022) uses a regression discontinuity design around the very low birth weight threshold to estimate the effect of infant health shocks.

Maternity and Parental Leave Policies. Prior to 2006, the parental insurance system in Canada was federally managed, offering new mothers up to 15 weeks of leave with 55% wage replacement, and additional 10 weeks of shared parental leave. In 2006, at the beginning of my sample, Quebec diverged from this federal scheme, introducing the Quebec Parental Insurance Plan (QPIP), which enhanced the replacement rate and implemented an extensive paternity leave. While this study follows a post-QPIP cohort and, therefore, cannot directly ascertain the causal impact of QPIP on our findings, a comparison between Quebec and the rest of Canada may shed light on the program's potential effects. For instance, if, as shown by Patnaik (2019), the QPIP increases father participation in household tasks, it could imply that infant health may have a more pronounced effect on fathers' earnings in Quebec compared to other provinces.

Child care programs. Quebec also stands out from the rest of Canada for its universal childcare policy. In 2000, the Quebec government began subsidizing eligible childcare facilities, making childcare affordable for all parents of children aged 0 to 5, at a low cost of $5 per day.[12] While it is clear how this program influences the motherhood penalty (e.g., Haeck et al. 2015; Karademir et al. 2024), it is not clear how it might influence my findings.

Health Care and Child Disability Benefits. Families in Canada may be eligible for the Canada Child Benefit and Child Disability Benefit (CDB), providing further financial support to families in need. These benefits are designed to provide additional support to families who may be facing financial challenges due to a child's severe mental or physical health problems or disabilities. It could be argued that the prospect of receiving these benefits can encourage mothers to work less (benefit effect versus child health effect).

2.2 Data, Sample Construction, and Descriptive Statistics

This study leverages a unique data integration project from Statistics Canada called "The Impact of Preterm Birth on Socioeconomic and Educational Outcomes of Children and Families (IPB)".[13] The IPB links vital statistics for all births in Canada between 1983 and 1996 (long-term cohort) and between 2006 and 2015 (short-term cohort) with several administrative data on mothers and families, including individual and family tax files (T1

[12]In fact, the program was first implemented in 1997 covering only children aged 4. The age eligibility was gradually reduced between 1997 and 2000.

[13]This project is available on request and can be obtained from a Statistics Canada Research Data Center.

Family File)[14], vital statistics on deaths and post-secondary information data. My analysis focuses on short-term cohorts (that is, children born between 2006 and 2015) due to better linking accuracy.

Administrative data on mothers and families contain valuable information on mothers' labor force outcomes. The annual individual and family tax files provide information on individual labor market earnings, total employment insurance benefits received, marital status, family size, and total family income. An interesting feature of these tax files is that they include information on tax credits received for children's disabilities and for one's own, separately. These variables are good proxies for detecting any differences in terms of the arrival of health shock between treated and comparison mothers. From these annual tax files, I construct a balanced panel of mothers from 2002 to 2018.[15] This time period is chosen so that you have labor market information at least four years before and three years after the child's birth for the 2006-2015 cohort. I convert the income data into dollars of 2015. In order to mitigate the influence of extreme outliers, I also topcode all monetary values at the 99.75th percentile in each year. The point estimates are not affected by topcoding but turn out to be slightly more precise. Working hours are not included in the tax files, so the analysis uses only earnings to estimate the impact on labor outcomes.

The births and deaths datasets contain information on the child's exact date of birth, province of birth, birth outcomes, parental age, and country of birth. I use the parents' country of birth to determine the immigration status of the parent. I restrict the sample to mothers aged 20-45 years to eliminate young mothers who are likely to be students with unstable incomes, eliminate births with missing information on gestation length and birth weight, and limit the sample to mothers giving birth to one child only during the observation period. Therefore, the analysis focuses on the impact of that focal birth.[16] Additionally, I use information on the date of death to limit the sample to children who survived during the period covered by the panel data, to ensure that grief and sorrow do not confound the results. Although this concerns less than 3% of the sample, it could be argued that the analysis ignores child mortality from the definition of the health consequences of low birth weight and preterm births. I explore the sensitivity of the results to this in Section 6.

[14]Which are equivalent to W2 records in the US.

[15]The first tax year available in the project is 1985 and the last year is 2018.

[16]Focusing on mothers who give birth only once during the study period increases the likelihood of isolating the impact of that specific birth. However, this does not exclude mothers who have given birth before the study period.

Lastly, the post-secondary education data contain information on all mothers who graduated or enrolled in a public post-secondary institution in Canada. From this dataset, I construct a mother's pre-childbirth educational attainment. Since information on the year and post-secondary program in which the mother is enrolled (or from which she graduated) is available, I consider the highest program level in which the mother is enrolled by the year of the child's birth to represent the mother's pre-childbirth education level. However, the education variables will be less precise since I do not have any information on the mother's postsecondary education if she attended postsecondary education abroad or in a private Canadian institution. The latter is less of a concern since postsecondary education is largely public in Canada.

Applying all these restrictions, I obtain approximately 680,000 unique pairs of mother/infant observations, of which 54,500 are treated (low birth weight or prematurity).

3 Research design

3.1 Comparison group construction

To construct a counterfactual that accurately represents the outcomes of mothers whose infant is low-weight or premature if they had given birth to a healthy child, I employ a matching design. This approach consists of pairing each treated mother with a mother who gives birth at term and to a baby weighing at least 2500 grams, but with, otherwise identical key demographic characteristics at child's birth and a comparable average income in the four years preceding the child's birth. Specifically, I carry out the matching design based on the following variables:

- Child outcomes: dummy for male child, dummy for being the first child ever born to the mother, year and province of birth;
- Maternal characteristics at childbirth: dummies for the mother holding a university degree, having no post-secondary education, being Canadian born, and being married or in common law relationship, and a continuous measure of age;
- Paternal characteristics: continuous measure of age, and a dummy for being Canadian born;

- Maternal and family economic variables averaged over the four years before the birth of the child: labor market income, share of years receiving unemployment insurance, share of years with non-zero labor income, and total family income.

Exact matching is often assumed to be the matching procedure that is more likely to ensure that balance in both covariates and unobserved factors is achieved between treated and control groups. However, it is unlikely to successfully find an exact for each of the treated mothers along all dimensions due to the so-called *curse of dimensionality*. For this reason, I use a matching procedure which combines exact and propensity score matching, similar to what is suggested by Rubin and Thomas (2000) and implemented by Stepner (2019), for example.

Since life cycle and health history can play an important role in determining future income and offspring health, I first match exactly on the child's year of birth, province, whether the mother becomes a mother (first child) and whether she has ever received a disability tax credit, to approximate health history. It should be noted that I match on first motherhood rather than age in order to capture the life-cycle trend. One simple reason is that exact matching on a continuous variable such as age would yield very few matched units. Furthermore, even with coarsed matching on age, the difference in child parity between treated and control mothers could result in a difference in response, irrespective of the difference in child birth outcome. In fact, online Appendix Table C.3 shows that maternal age does not have predictive power on postnatal earnings, whereas first motherhood has a higher predictive power. I also exactly match on a dummy variable indicating whether information on post-secondary education is missing. I do this because this variable could either indicate a level of education equivalent to upper secondary or lower, or indicate that post-secondary education is missing for some other reason.[17] This step generates a set of control mothers for each mother with unhealthy child.

Next, I use a logistic regression to estimate the propensity score, which is the conditional probability of being treated given maternal and family economic variables prior to the event, as defined above. Finally, the best match for each treated mother is basically the one with the closest propensity score. This approach ensures that the comparison mothers have identical life-cycle trend but also similar pre-event earnings.

[17] As mentioned in Section 2, this post-secondary education could be missing if the mother attends post-secondary institution abroad.

In a sensitivity analysis (Section 6), I compare the main results with those obtained using a more parsimonious matching approach.

3.2 Event study specification

To estimate the gap in motherhood penalty due to infant health, I build upon the literature using an event study design and matched comparison group.[18] To do so, I consider the following specification:

$$y_{ik} = \alpha_i + \sum_{-4,k\neq-1}^{7} \beta_k + \sum_{-4,k\neq-1}^{7} \gamma_k Unhealthy_i + \epsilon_{ik}. \tag{1}$$

In each period k relative to the birth, this equation estimates the penalty for mother i of giving birth to a low-birth-weight or / and a preterm baby on the outcomes y (e.g., earnings, participation in the labor force). α_i is an individual fixed effect that allows each mother to have a different level of results y due to characteristics not included in the model. β_k estimates secular changes in the mean outcome y among mothers in the comparison group. The event time $k = -1$ is omitted so that the changes are relative to the year preceding the child's birth. The parameters of interest are γ_k that evaluate the gap in the outcomes between mothers whose child is born unhealthy and mothers whose child is born healthy.

The dependent variables in the regression (1) are in level instead of logarithmic to keep zeros due to non-participation in the data set.[19] Therefore, γ_k evaluates the causal effect in levels. To have a percentage measure of the infant health penalty, I construct a measure in the same spirit of recent estimates of the child penalty (e.g., Kleven et al. 2021; Artmann et al. 2022; Andresen and Nix 2022):

$$ATT_k = \frac{\gamma_k}{E[\widetilde{y_k} \mid k]}, \tag{2}$$

where $\widetilde{y_k}$ is the predicted counterfactual outcome in year k since the child's birth.[20] Therefore, ATT_k should be interpreted as the percentage change in the outcome at relative year k of

[18] See Sarsons (2017), Stepner (2019) and Jäger and Heining (2022) for example.

[19] Given that the data include negative values for earnings, I further test the robustness of my findings by restricting the sample to observations with non-negative earnings and applying a log transformation to the dependent variable. The results remain consistent with this approach.

[20] Basically, I obtain those predictions by running the following regression: $\widetilde{y_{ik}} = \alpha_i + \sum_{-4,k\neq-1}^{7} \beta_k$.

mothers of poor health children compared to what they would have obtained if their child had been born healthy. I compute robust standard errors by randomly resampling the match pairs with replacement and reestimating the event study regressions using 250 bootstrapped samples. To account for within pair correlation, I cluster the standard error at that level.[21]

The identification assumption is that within the matched sample, giving birth to low-birth-weight or preterm child is *as good as random*. Consequently, there would not have been a differential impact of childbirth on income in the absence of child health problems. For this assumption to be more likely to hold, the parameters ATT_k should not be statistically significant for $k < 0$ (i.e., before the event). This ensures that any observable differences in earnings can be attributed to the health issues of the newborn rather than preexisting trends or disparities between mothers. In Section 6, I discuss how this could be violated even if the parallel trend is verified.

4 Main estimates

4.1 The infant health penalty

I begin by presenting the effect of giving birth to a low-birth-weight or premature child on the trajectory of both maternal and family monetary outcomes. Figure 1 plots the evolution of the gap between mothers who had given birth to an unhealthy child and mothers who had given birth to a healthy child from four years before to seven years after the event. Each dot in the figure gives the percentage transformation of the earnings gap estimates in each time k (relative to the year before the event $k = -1$) based on the specification in 1-2.

First, Figure 1 shows that there is virtually no apparent gap between treated mothers and mothers in the comparison group before the child is born, while the years following the event are marked by a gap, either in market income (in panel (a)), total income (in panel (b)) or total family income (in panel (c)). Because there is no statistically significant difference before the child's birth, the penalty observed afterward is less likely to be driven by preexisting difference.

Looking at market earnings, I find that there is an increasing infant health penalty over the event study time window that becomes significant one year after the birth. Seven years

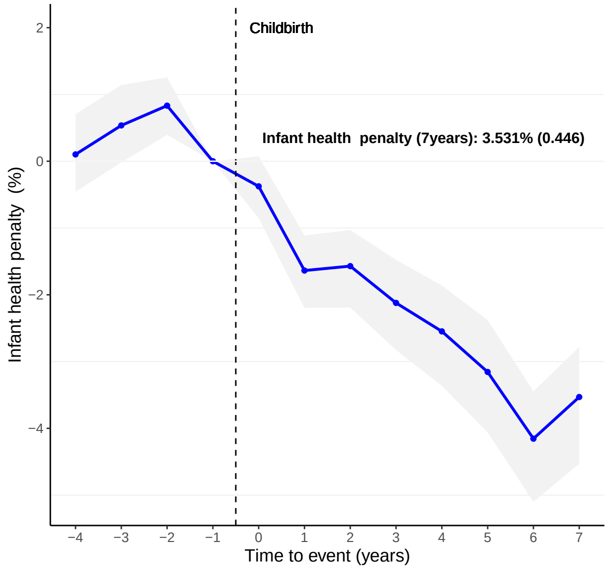
[21] De Chaisemartin and Ramirez-Cuellar (2024) show this level of clustering ensures robust inference in match pair design. However, the results are robust to clustering at the individual level.

after the birth of the child, mothers with unhealthy newborns earn 3.53% less on average than their counterparts with healthy newborns. Although the penalty seems to increase at a constant rate overall, the rate of increase appears to be highest in years 1 and 6. In year 1 the gap is 1.64%, while it was almost zero in the year of birth. Similarly, the gap is 4.16% in year 6, compared to 3.16% in year 5 (see the point estimates in online Appendix Table D.4). This heterogeneity in the timing of the effect could mask the relationship between infant health and the child's development stage. Firstly, low-birth-weight or premature babies may require more medical assistance in the first year of life, which could force mothers to take more time off work to care for their child. If the infant's health is accompanied by disability (or repeated health shocks) during childhood, this could be particularly difficult for parents, especially at the age of school entry (around age 6), resulting in a greater penalty.

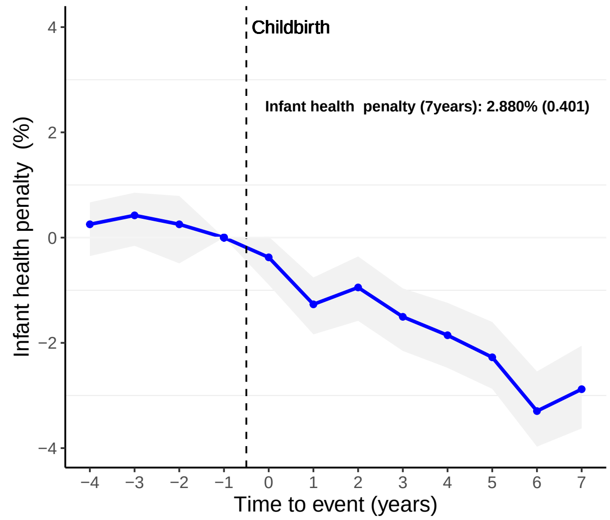
Panel (b) depicts the same pattern as panel (a). There is an increasing gap between mothers who had an unhealthy baby and mothers who had a healthy infant in total income. Compared to mothers in the matched comparison group, mothers who have a child with a ill health at birth have a 2.88% loss in their total income seven years after the child's birth. Compared to the penalty on market earnings, the effect on total income is smaller. This could suggest that government benefits or transfers compensate for some of the loss of income due to the child's health.

Looking at the household total income which consists of both partners income suggest a potential infant health penalty on fathers too.[22] The gap between the treated and untreated mothers is 4.2% seven years after the child's birth which is slightly larger than the gap in market earnings. Even tough it could suggest an effect on fathers too, the penalty might not be in the same magnitude as on mothers. For example, from year 1 to year 5, the gap tends to be quite stable around 3.3%, while it was increasing for both labor market income and total income for mothers.

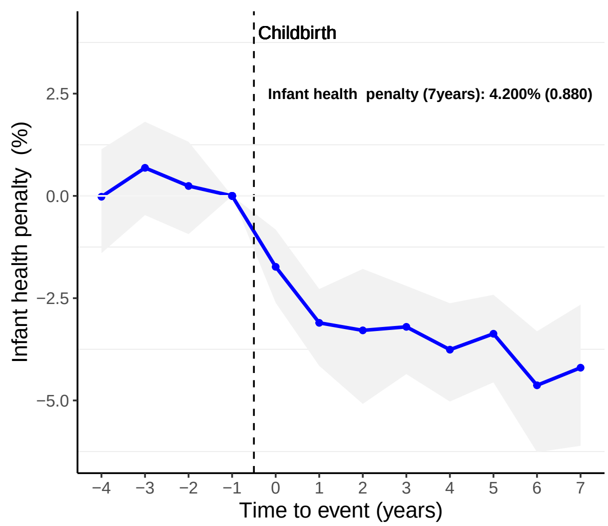
[22] This corresponds to 70% of the sample.



(a) Effect of infant health on earnings trajectory



(b) Effect of infant health on maternal total income trajectory



(c) Effect of infant health on family total income trajectory

Figure 1: Infant penalty: Main estimates

Notes: The figure shows the percentage income gap (ATT_k defined in equation (2)) between mothers with an unhealthy child and mothers in the matched comparison group. The difference is calculated for each year, from four years before the child's birth to seven years after. Panel (a) shows the labor market income gap. Panel (b) shows the gap in total individual income, and panel (c) shows the gap in total family income. Standard errors are clustered at the matched-pair level and calculated using 250 bootstrap replications.

Fathers vs mothers. The data do not contain the earnings of the fathers. Instead, I infer the earnings of the spousal as the difference between the family total income and the mother's total income. Then, to avoid measurements error in the spousal earnings, I restrict

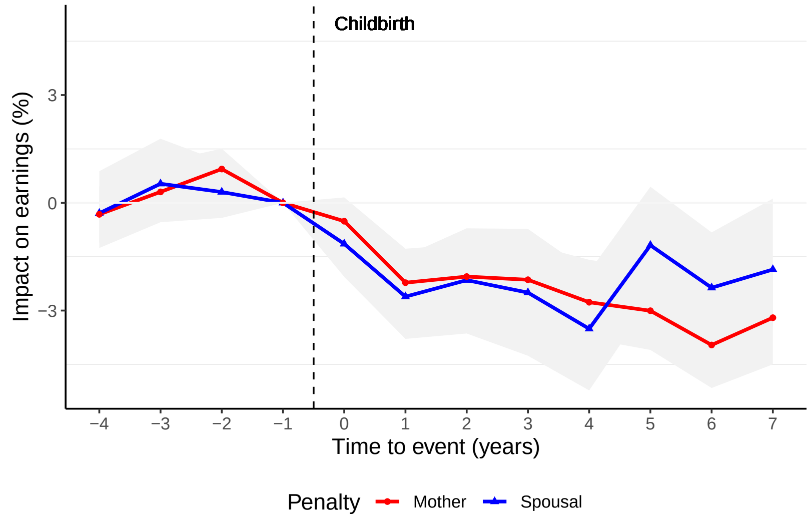


Figure 2: Infant health penalty: Fathers vs. mothers

Notes: The figure shows the percentage income gap (ATT_k defined in equation (2)) between mothers with an unhealthy child and mothers in the matched comparison group in red, and the same difference for the spouses in blue. The sample is limited to dual-income families, as the difference between total household income and the mother's income is more likely to reflect the *father*'s income. Standard errors are clustered at the matched-pair level and calculated using 250 bootstrap replications.

the sample to dual-earner households. In Figure 2, I show the penalty for infant health for mothers and mothers' partners. I find a somewhat surprising result. Fathers suffer the same or worse income penalty in the first four years of a child's life. After the age of 4, there appears to be no statistically significant difference in income between the partners of mothers whose child is in poor health and the partners of mothers whose child is in good health at birth. However, the gap between mothers never fades during the seven-year period. This suggests that the infant's health conditions may affect both partners equally in the short term, but that the incomes of mothers will not ultimately return to their pre-birth levels, while fathers could.

4.2 Determinant of the earnings penalty

Conceptually, a decrease in earnings can be decomposed into changes in employment status (extensive margin) or changes in earnings among employed (intensive margin). In this section, I investigate the role of each of these two components in explaining the infant health penalty. Without information on hours worked or wages, restricting the analysis to the sample with non-zero market earnings can provide insight into the intensive margin[23] while the probability of receiving non-zero market earnings can help think about the labor supply at the extensive margin. Figure 3 presents the event studies for the intensive margin labor supply (panel (a)) and for the extensive margin labor supply (panel (b)).

Consider first the intensive margin (panel (a)). After the birth year, there is a sharp decrease in the earnings of treated mothers compared to mothers in the comparison group. In year 1, mothers with an unhealthy baby earn around 1.3% less than their counterpart mothers with a healthy baby, which is identical to the penalty for the whole sample. This gap narrows from the second year onward, remaining stable around 0.85%. This gap is not consistent with the trend observed for the whole sample, indicating that the response to infant health may not be at the intensive margin. However, the trend of penalty for the sample of working mothers (i.e., with non-zero earnings) is similar to Figure 1 at key points. Specifically, at school entry age (around age 6), the gap is highest, as it is for the whole sample.

With regard to the probability of nonzero income, panel (b) shows no gap before the birth of the child and a continuous overall increase in the gap from the year of the event onward. In particular, from the child's birth onward, mothers of low-birth-weight or preterm children are continuously less likely to have a nonzero income (i.e., to work) than mothers in the matched comparison group. This suggests that mothers' response to their child's initial health status is to not participate in the labor market. The fact that this penalty increases could be justified by the fact that, as the child grows, it becomes difficult to reconcile work and family life, especially if the initial endowment is a precursor to repeated health problems.

Overall, given that the effect on labor market participation is closely similar to the pattern of infant health penalties, it is more likely that the extensive margin is the main driver of the penalty. However, the intensive margin could also play a non-trivial role, particularly so at one and six years after the child's birth.

4.3 Does infant health affect the transition to poverty?

An interesting question is whether the child health gap translates into a transition to low socioeconomic status for mothers and potentially to the family. To test this, I use the

[23] However, the choice to work is clearly endogenous in the sense that treated mothers might choose to continue participating in the market if the child's health problem is not serious.

(a) Penalty for the sample of employed

(b) Participation

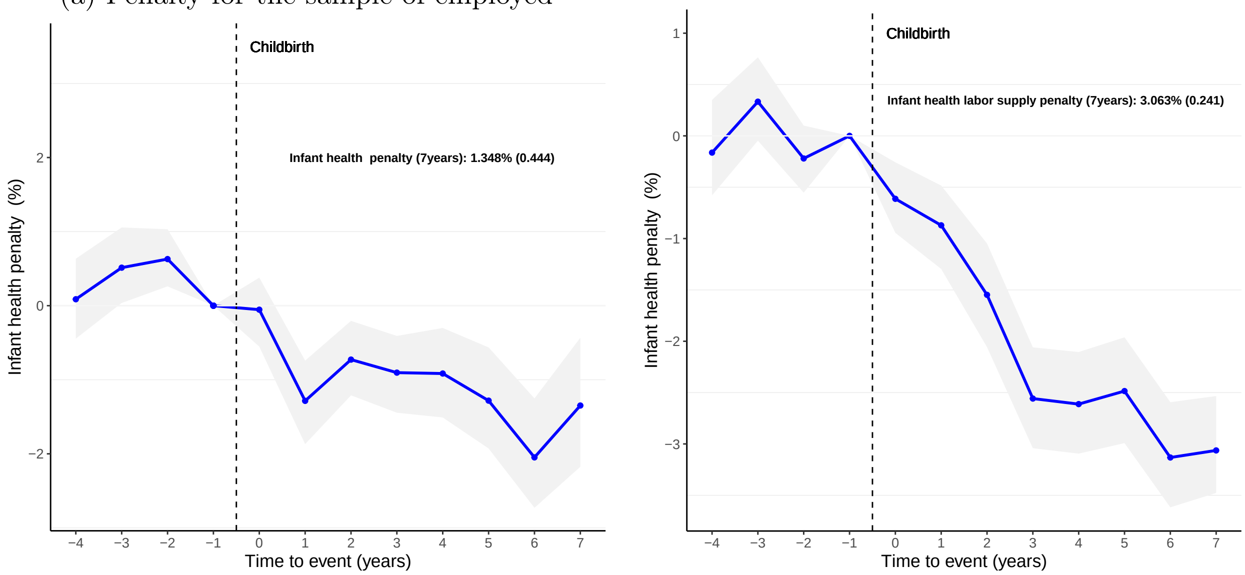


Figure 3: Determinants of the infant health penalty

Notes: The figure shows the infant health penalty for mothers in each year relative the child's birth. The infant health penalty is defined as the percentage income gap (ATT_k defined in equation (2)) between mothers with an unhealthy child and mothers in the matched comparison group. Panel (a) shows the penalty for labor market income for the sample of mothers with non zero income. Panel (b) shows penalty for the probability of non zero income (proxy for participation). Standard errors are clustered at the matched-pair level, and calculated using 250 bootstrap replications.

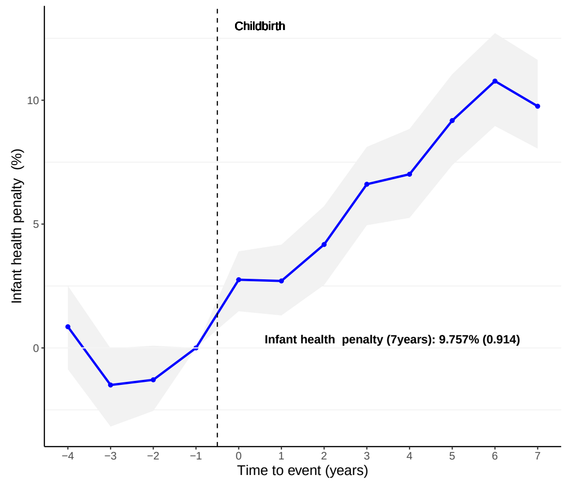


Figure 4: Impact of health status at birth on earnings inequality

Notes: The figure shows the infant health penalty for income inequality from four years before to seven years after the child's birth. The penalty measures the percentage gap in the probability of income falling in bottom quartile of earnings distribution between mothers with an unhealthy baby and mothers with a healthy baby. Standard errors are clustered at the matched-pair level, and computed using 250 bootstrap iterations.

probability that maternal income falls into the bottom quartile of the income distribution in a given calendar year as the outcome in my event study specification. Figure 4 shows the result of this exercise.

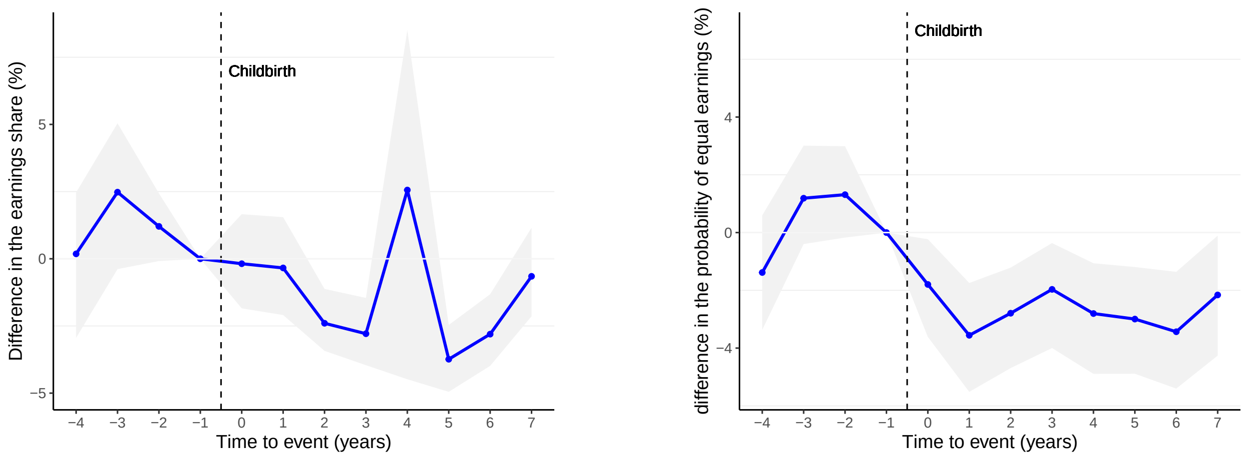
As for the other outcomes, Figure 4 shows that there is no significant difference between treated and untreated mothers before the child was born. From the year of birth to seven years after the focal child's birth, mothers whose children were born prematurely or at low birth weight are more likely to have their earnings fall in the low-earning label compared with their counterparts whose newborns are healthy. By year 7, treated mothers are about 10% more likely to have their earnings in the bottom earnings quartile of the earnings distribution. This result suggests that infant health can also influence income inequalities between women.

4.4 Infant health penalty within the household

I next examine how infant health influences the gender gap within the household. To explore this, I first compare mothers' share of the household's income between families with treated (mothers of unhealthy infants) and untreated (mothers of healthy infants) status. Then, I look at the probability that the earnings of a mother account for at least 40% of the total income of the household. Figure 5 presents the results.

Panel (a) presents the result of the event study when the outcome is the mothers earnings share in the household. It shows a mixed impact of child health at birth on the evolution of the mothers' earnings share in the household. There is no difference between mothers with unhealthy and mothers with healthier infant in this outcome in the first two years of the child life.[24] Relative to mothers with healthier newborns, the share of household income of mothers with unhealthy babies tends to be reduced by 3% two to three years after the child's birth. However, this gap disappears one year later, when the child turns 4. At the child-school entry age, around 5 and 6, the gap is now around 4%-3%. While panel (a) shows little evidence of the impact of infant health on the gender earnings gap in the household, panel(b) shows a more pronounced impact of infant health on the probability of egalitarian earnings within the household. There is a persistent gap in the probability that mothers' earnings account for at least 40 % of the total earnings in the household between mothers with healthy babies and mothers with unhealthy babies. The gap is more important in two periods: the first year of life of the child and at his school entry age (age 6). One year after the birth of their respective child, the mother whose child is born unhealthy is 3.56% less likely to have her earnings accounting at least 40 percent of the total family income, while this gap is 3.43% 6 years after the birth of their respective child. These findings suggest that the disparity in income share between wives and husbands may not be solely attributed to gender identity norms (see Bertrand et al., 2015; Doumbia and Goussé, 2021), but also to caregiving responsibilities often assumed by mothers.

[24] This is consistent to the the big effect on fathers' income in those years.



(a) Mothers earnings share in the household

(b) Equal earners in the household

Figure 5: Impact of infant health on the intra-household income gap

Notes: The figure is constructed from the sample of dual-earner households in Figure 2. Its purpose is to study the role of infant health on the intra-household income gap. Panel (a) shows the penalty of child health on the share of mothers' income in total family income, while panel (b) shows the penalty on the probability that mothers' labor market income represents at least 40% of total family income. As in the other figures, the penalty measures the difference in outcomes between mothers of a low-weight or premature child and mothers in the matched comparison group from year 4 before to year 7 after the child's birth. Standard errors are clustered at the matched-pair level, and calculated using 500 bootstrap replications.

5 Potential mechanisms

The simple model proposed in online Appendix B suggests three drivers of the infant health penalty: gender norms, productivity shocks, and child care time needs. This section investigates the relationship between poor health at birth and these outcomes.

5.1 Couple dissolution

Infant health or children's health in general could influence exposure to gender norms if it changes the family structure. In this regard, Kvist et al. (2013) find that parents with children diagnosed with attention deficit and hyperactivity disorder (ADHD) are more likely to terminate their relationship, while Eriksen et al. (2021) and Breivik and Costa-Ramón (2024) do not find any relationship between child disability and dissolution of the couple. Since annual tax files also contain information on individuals' marital status, the probability of being divorced or separated as an outcome in equation (1) to test whether couple dissolution drives the findings.

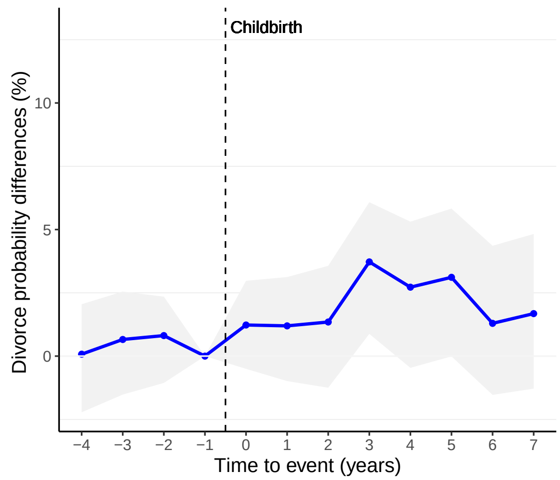


Figure 6: Couple dissolution differences

Notes: The figure shows estimates based on the equation (2) of the difference in the probability of being divorced or separated between mothers with an unhealthy child and mothers in the matched comparison group. Standard errors are clustered at the matched-pair level, and computed using 250 bootstrap replications.

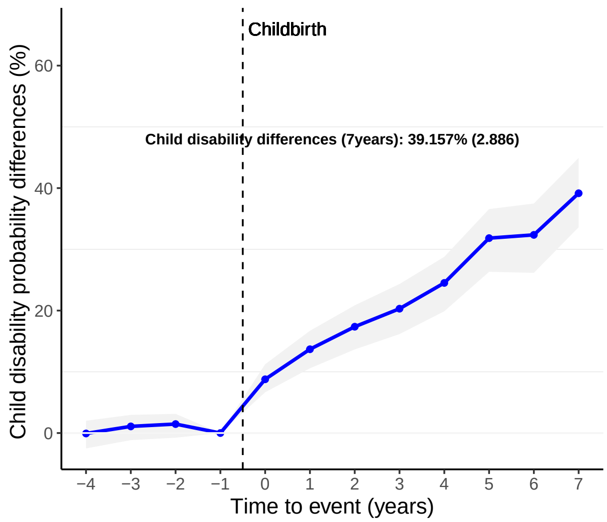
Figure 6 shows that there is no conclusive evidence on the impact of low birth weight and prematurity on parental relationship outcomes. Mothers of unhealthy newborns and mothers of healthy newborns seem to have a similar dissolution pattern over the time window. While the point estimates could suggest a higher probability of marriage dissolution following a low birth weight or premature birth, most of the coefficients are not statistically different from zero.

5.2 Childhood disability

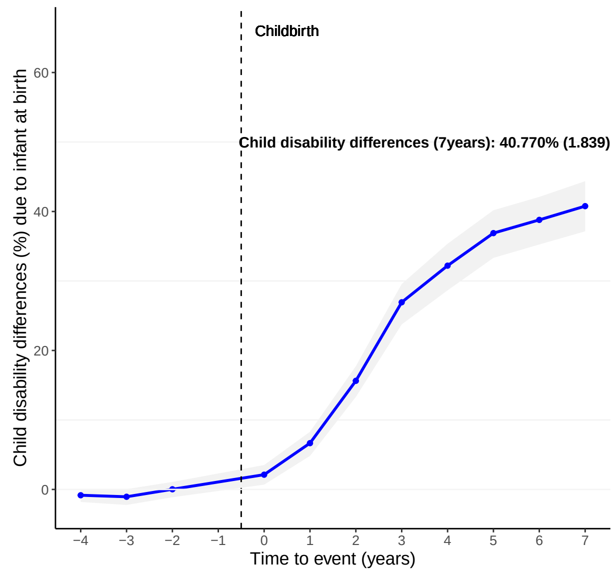
Existing medical and economics studies emphasize the role of prematurity and low birth weight in determining future health trajectories. This relationship could explain the persistence of the infant health penalty. That is, low birth weight and prematurity could set the stage for health vulnerability during childhood, which would require important care time later. To test this mechanism, I focus on the probability that mothers receive a tax credit for any dependent disability and the probability that she receives a child disability benefit.[25] As discussed in Section 2.1, Canadian families with a child under 18 years of age with severe

[25] Readers should note that the tax credit and the disability benefit are two different things. The latter is paid to parents in addition to the former (i.e., disability reimbursement). In the absence of taxable income, eligible parents can still benefit from the child disability benefit.

or prolonged impairment of physical or mental functions are eligible for the child disability benefit. Thus, using this benefit as a proxy for the onset of health conditions in childhood offers insight into the relationship between health at birth and health in childhood. However, it is important to note that these outcomes may not fully capture the less severe day-to-day care time needs, which detailed health records could provide.



(a) Tax credit for a dependent disability



(b) Child disability benefit

Figure 7: Impact of health at birth on the trajectory of disability in childhood

Notes: This figure aims to highlight how low birth weight and prematurity are related to health vulnerability in childhood. To do this, I use the probabilities of receiving dependent tax credit and disabled child benefit as outcomes in the event study. Panel (a) shows the difference in the probability of obtaining a dependent tax credit, while panel (b) shows the difference in receiving a disabled child benefit between mothers with an unhealthy child and their counterparts in the matched comparison group. Standard errors are are clustered at the matched-pair level and computed using 250 bootstrap iterations.

The results of this event study are presented in Figure 7. I find striking evidence of the difference in probability of receiving a dependent tax credit (panel (a)) or a disabled child benefit (panel (b)) between treated mothers and mothers in the matched comparison group. Firstly, as there is no statistically significant difference before birth, it is reassuring that there is no difference in the outcomes of previous children. Secondly, I find that mothers whose newborns are low birth weight and/or born before term are increasingly likely to receive a dependent tax credit or a disabled child benefit from the year of the child's birth onwards, compared with their counterparts whose children were born healthy. Interestingly, the difference is almost identical for both outcomes in the seventh year after birth, suggesting that I am capturing the child's disability instead of any other family-dependent disability with both outcomes. In particular, the gap is 39% and 40.7% respectively. This result strongly suggests that childhood health conditions may be the an important driver of the persistent earnings gap between mothers with unhealthy and healthy infants.[26]

5.3 Maternal earnings capacity

Poor pregnancy outcomes can give rise to long-lasting health shocks, constituting an important productivity shock. To investigate the impact of poor infant health on the health trajectories of mothers, I utilize the likelihood of receiving a tax credit for disability for themselves as the outcome measure in my event study. This tax credit is granted when medical practitioners certify that an individual has prolonged limitations in mental functions, mobility, hearing, or other similar constraints. While this measure may not capture every nuance of an individual's daily health challenges, it serves as a broad indicator of significant health impairments such as fatigue, burnout, or mental health challenges that may arise from the stress and exhaustion of having a health impaired child.

[26] For interested readers, online Appendix Table E.5 provides a non-exhaustive list of health conditions eligible for the Child Disability Benefit, along with references to studies that show their association with low birth weight and preterm births.

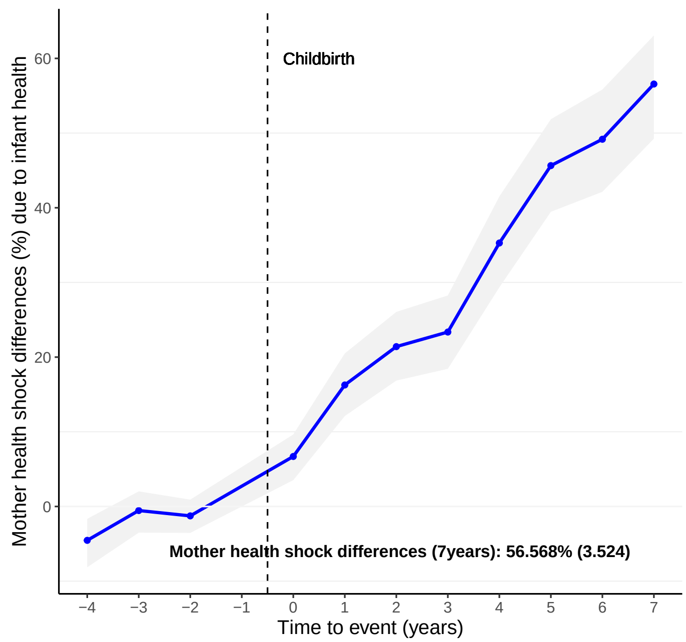


Figure 8: Impact of child's health status at birth on mothers work limitations

Notes: This figure aims to highlight the influence of poor infant health outcomes on the mother's health trajectory. To do this, I use the probability of the mother receiving a tax credit for her own severe limitations in physical or mental function as the outcome in the event study. Standard errors are clustered at the individuals level, and computed using 250 bootstrap iterations.

Figure 8 shows that the trajectory of the probability of major health shocks between mothers of unhealthy infants and those in the comparison group mirrors the trajectory of children's disability probability. Importantly, there is no observable difference in these probabilities before the birth, which supports the robustness of the study design in controlling for preexisting health conditions that could influence employment outcomes post-birth.

From the birth of the child to the end of the event study window, mothers of unhealthy infants increasingly become more likely to receive a tax credit for their own disabilities compared to mothers in the comparison group. In the seventh year, this gap expands to 56.57%, highlighting a substantial increase in disability claims among affected mothers. This finding aligns with the hypothesis that the emotional stress of caring for a child with health problems can significantly impact a mother's mental and physical health.[27] Supporting this, Breivik and Costa-Ramón (2024) find that adverse child health events, such as death or hospitalization, are associated with a more than 55% increase in mother's hospital visits for

[27] A relevant question is what happens to fathers. Unfortunately, the available data do not allow us to answer this.

mental health issues within one year after the event.[28]

5.4 Labor force attachment

It is possible that a mother whose child is born in poor health spends more time off work during the postnatal period, leading to a depreciation of her human capital. To explore this, I use the length of maternity leave as both a continuous variable and a dummy variable to take the full 15 weeks of entitled maternity leave as outcomes in a linear regression similar to 3.[29] The results are presented in online Appendix Table J.8. I find that giving birth to a low-weight or preterm child is associated with an additional 0.12 weeks of maternity leave. The effect is more pronounced when considering the probability of taking the maximum number of weeks of maternity leave. I find that a mother whose child is born in poor health is 18% more likely to take the full 15 weeks of entitled maternity leave.

5.5 Mediation analysis

The results point to the care time load and possibly the mental load to explain the persistence of the infant health penalty. In this section, I attempt to understand the contribution of each of these mechanisms in each year after the child's birth. To do so, I apply the decomposition method proposed by Gelbach (2016). The mediation analysis is based on the idea that infant health has both direct and indirect effects on a mother's earnings. The indirect effects are reflected in the impact of infant health on future child and mother health shocks, as predicted by the model in online Appendix B. The empirical equivalent of the equation (6) is :

$$\underbrace{\frac{\mathrm{d}Y_{ik}}{\mathrm{d}\mathbb{1}\{t-c_i=k\}Unhealthy_i}}_{\textbf{total effect}} = \underbrace{\sum \frac{\partial Y_{ik}}{\partial M_{ik}} \frac{\partial M_{ik}}{\partial \mathbb{1}\{t-c_i=k\}Unhealthy_i}}_{\textbf{indirect effects}} + \underbrace{R_{ik}}_{\textbf{unexplained part}},$$

where M_{ik} is either an indicator of mother i receiving tax credit for her own or for her child disability in time k (the mediators).[30] To estimate the contribution of each mediator, I then

[28]Another interesting piece of evidence comes from Burton et al. (2008), which shows that Canadian mothers of disabled children rate their health status generally poor.

[29]This analysis is based solely on the sample of mothers from all provinces, except Quebec. Maternity leave in Quebec is not managed by the federal employment system, which is the source of information on maternity leave.

[30]$\mathbb{1}\{t-c_i=k\}$ is a dummy variable indicating the number of years elapsed since or leading up to the child's year of birth, c_i.

estimate two additional specifications.

First, I estimate specification 1 augmented with the vectors of the two mediators:

$$y_{ik} = \alpha_i + \sum_{-4,k\neq-1}^{7} \beta_k + \sum_{-4,k\neq-1}^{7} \gamma_k Unhealthy_i + \delta^j M_{ik} + \epsilon_{ik}.$$

Second, I estimate the effect of the treatment(infant health) on each of the two mediators:

$$M^j_{ik} = \alpha_i + \sum_{-4,k\neq-1}^{7} \beta_k + \sum_{-4,k\neq-1}^{7} \lambda^j_k Unhealthy_i + \epsilon_{ik}.$$

Finally, the contribution of each of the mediator is given by the ratio :

$$\Delta^j_k = \frac{\delta^j \lambda^j}{\gamma_k}$$

The results of this exercise should be taken as suggestive, as I need an additional source of exogenous variation to examine the impact of the mediator on income trajectories. online Appendix Figure L.5 shows the evolution of the mediator's contribution to the estimated earnings penalty in panel (a) and for the participation penalty in panel (b). The results suggest that the roles of child disability benefits and tax credits for their own disability are limited, contributing less than 15% of the infant health penalty in any given post-birth year. Given the benefits eligibility criteria, which require serious health conditions, this modest contribution is understandable. However, a deeper examination of the figure reveals some interesting facts.

First, both panels show that childhood disability contributes more to the infant health penalty. For example, panel (a) reveals that child disability accounts for about 8% of the income gap, while disability related to the mother's mental or physical health contributes less than 4% in the seventh year after birth. This disparity might indicate that caregiving demands drive the penalty predominantly.

Second, the magnitude of the mediation power of childhood disability is in the same range as the mean of 9% of mothers with disabled children. This suggests that this speaks only to this group. I explore the validity of this point by estimating the penalty with a sample of mothers who never received the child's disability benefit. The results remain fairly unchanged.

Lastly, panel (b) suggests that the contributions of mother and child disabilities to the participation gap are identical in the year after birth, aligning with the typical onset period for postpartum depression, highlighting how infant health could trigger such conditions.[31]

6 Sensitivity analysis and robustness checks

Existing child health burden. Another issue of concern is the possible influence of existing fertility burden on the magnitude of the findings even if the mothers in the matched comparison group are matched on the base of parity. Specifically, mothers with unhealthy newborns may be more likely to have given birth to previously unhealthy children, which introduces a strong potential upward bias in the analysis. To address this issue, the sample was restricted to first-time mothers, thereby removing the confounding effects of previous childbirths or the health status of previous children. The results are invariant (see online Appendix Figure K.4).

No difference around the threshold. Another consideration is that the modest infant health penalty I observe may be due to minimal differences in later health outcomes for children just above and below the low birth weight threshold. To explore this, I incrementally exclude observations in bins of 100g, 200g, 300g, 400g, and 500g around the low birth weight threshold. The findings show that as the bin size increases, the penalty on mothers' earnings, mental or physical health becomes more pronounced. This supports the idea that more severe health consequences from poor initial health lead to a greater infant health penalty.[32]

Different behavior during pregnancy. In this study, I intentionally do not match on economic variables, such as earnings, during the year of delivery. This is chosen to account for the possibility that differences in maternal behavior during pregnancy could influence birth outcomes, aligning with the fetal programming hypothesis. However, this approach introduces a potential confounding factor: the possibility that these pre-birth behaviors, rather than the health condition of the infant, might explain the observed income gap between the treated and control groups post-birth. Consider, for example, a scenario in which a mother chooses to work more during her pregnancy, perhaps in anticipation of taking time off after childbirth. This increased work-related stress could potentially contribute to

[31] Postpartum depression commonly affects new mothers from four weeks to six months after childbirth (Miller, 2002).

[32] Corresponding figures are available upon request.

the child being born prematurely or underweight. In such a case, what my study design might capture is not solely the infant health penalty, but also the impact of earlier labor supply decisions. As shown above, no penalty is observed in the year of the child's birth, which is reassuring. Additionally, when I include outcomes from the year of the child's birth as matching variables, I find no significant change in the results.

Alternatives comparison group. All the results of this study are based on the assumption that the trajectory of the comparison group reflects the trajectory that mothers whose child was born in poor health would have had if the child had had better birth outcomes. Here, I ask how sensitive the findings are to alternative ways of constructing the counterfactual. In this regard, I consider three alternative matching approaches: 1) I perform exact matching on the child's year of birth and province - which generates more than one unit of control mothers for each mother treated; 2) exact matching on year of birth, province, whether the mother is a first-time mother, whether she has ever received a disability tax credit; 3) one-step propensity score matching with all the variables described in Section 3 included. Online Appendix Figure F.2 shows the event study with these matching alternatives. In general, whichever way I construct the counterfactual, I find that there is an increasing child health penalty after childbirth. However, the magnitude of the penalty is not the same everywhere. The size is very similar in the case of exact one-step matching (panel (a) versus panel (b)). This suggests that matching on maternal health shock and birth parity does not change the result much. On the other hand, matching on other variables such as pre-birth economic outcomes seems to limit the influence of the bias described above, as panel (c) shows a slightly smaller effect. Nevertheless, I argue that the way I carry out the matching allows me to construct an appropriate counterfactual since compared with one-step propensity score matching (panel (c)), it is more likely to result in parallel pretrends.

7 Heterogeneity analysis

7.1 Varying institutional context

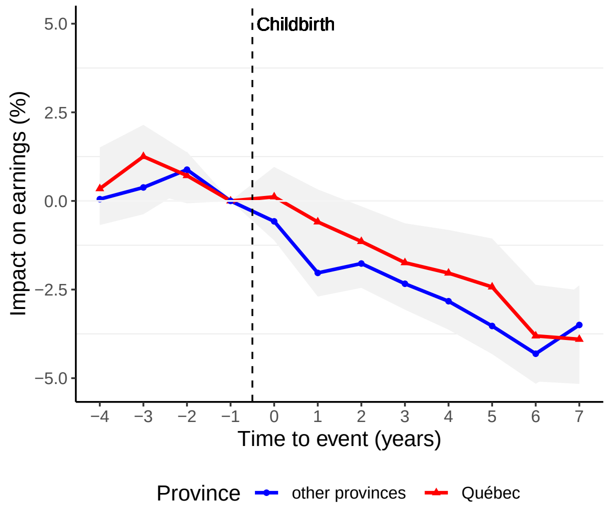
As discussed in Section 2.1, family policies vary significantly across Canadian provinces, with Quebec's policies being notably different from those in the rest of Canada.[33] To assess how

[33] It is not just about family policies but policies to combat poverty in general (see Van den Berg et al. (2017)).

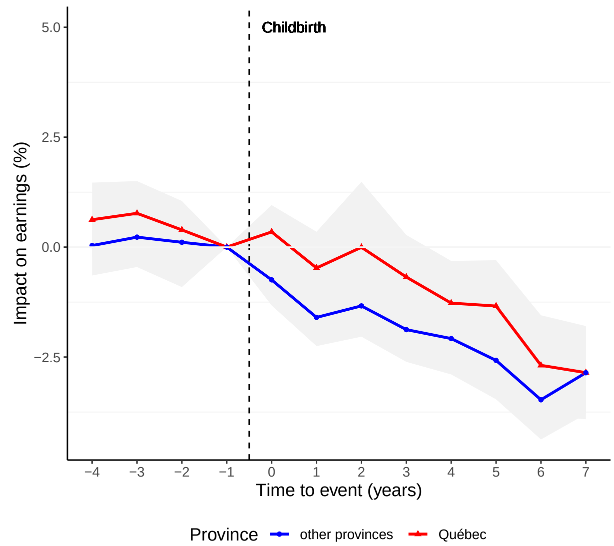
these policy differences might influence the results, I re-estimate the infant health penalty separately for Quebec and the rest of Canada. Figure 9 shows the result for maternal earnings in panel (a) and for total income in panel (b). In panel (a), one of the noticeable features is that the infant health penalty becomes apparent only after the first year after the child's birth for mothers in Quebec. In contrast, in the rest of Canada, this penalty is observable from the birth year onward and is larger in magnitude. However, this variation could be attributed to differences in sample size and sample composition. But the variation in the difference between Quebec and the rest of Canada over time — particularly its prominence in the postnatal period targeted by maternal leave policies — suggests that Quebec's more generous family programs may mitigate some of the impact of infant health earlier on in the child's life. This is an important consideration, even though the differences are not statistically significant across all time points, since the confidence intervals of the point estimates overlap.

Panel (b) tends to confirm this assumption. Indeed, the influence of the infant's health on the mother's total income does not appear until four years after the child's birth in Quebec. In contrast, in the rest of Canada, the economic penalty is evident immediately from the event year. This reinforces the fact that generous maternity leave policies are effective in compensating for the loss of income due to short-term pregnancy complications and/or that childcare policies reinforce mothers' participation in the labor market, even in the presence of shocks to children's health. However, in the long term I cannot draw such a conclusion, as the infant health penalty tends to be the same in all provinces.[34]

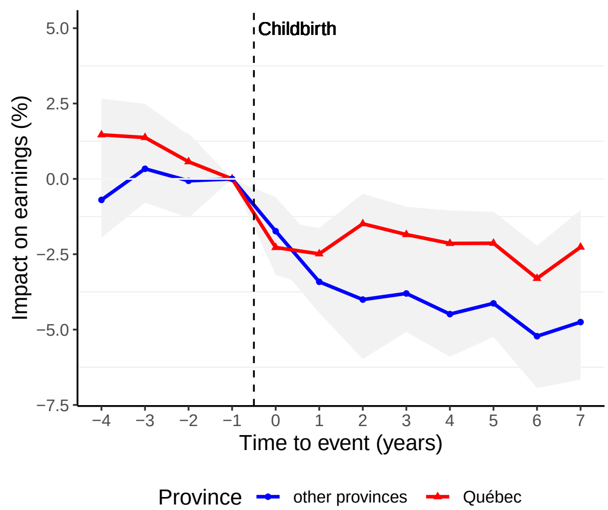
[34] There are some papers showing that parental leave policies have no long-term effect (e.g., Lalive and Zweimüller, 2009; Rossin-Slater et al., 2013; Dahl et al., 2016).



(a) Effect of infant health on earnings trajectory



(b) Effect of infant health on maternal total income trajectory



(c) Effect of infant health on family total income trajectory

Figure 9: Infant penalty: Quebec vs. the rest of Canada

Notes: This figure is constructed in the same way as Figure 1 and compares the infant health penalty in Quebec and the other provinces. Panel (a) compares the infant health penalty on labor market income for mothers in the province of Quebec and mothers in the other provinces. Panel (b) compares the infant health penalty on total income of mothers in the province of Quebec and mothers in other provinces. Panel (c) compares the infant health penalty on total household income for mothers in the province of Quebec and mothers in other provinces.

7.2 Low birth weight or Prematurity?

To investigate which health conditions at birth matters the most in explaining the finding, one strategy would be to divide the sample into two groups: the low birth weight and premature births groups. However, this would lead to a loss of statistical power and, in many cases, both prematurity and low birth weight would be encountered, resulting in repeated observations across samples that would no longer be independent. To address this issue, I consider a model in which both the low birth weight and prematurity indicators are entered simultaneously as independent variables. By including both the low birth weight and prematurity indicators simultaneously in the model, I can disentangle the effect of each factor on post-pregnancy earnings. The regression based model takes the following form:

$$y_{ipymc} = \alpha D_{i(1-p)} + \beta_1 LBW_i + \beta_2 Preterm_i + \gamma Z_i + \lambda_c + \delta_m + \theta_s + \epsilon_{ipymc}, \qquad (3)$$

where y_{ipcms} is the average earnings over the seven year after child's birth p of mother of child i born in year y, month m and in province c ; $D_{i(1-p)}$ is a vector of socio-economic variables including earnings, insurance benefits, family size and marital status averaged over the last four years before child's birth; Z_i contains demographics of mother and father at the time of the birth of child i ; LBW_i and $Preterm_i$ are respectively indicators for low birth weight and prematurity. By controlling for cohort fixed effects (λ_c), month of birth fixed effects (δ_m), and city of birth fixed effects (θ_s), I expect to capture the effect of health at birth on post-pregnancy earnings average over the medium and long term, net of any remaining unobservables shock to labor supply and health not netted out by the matching method.

In order to capture the precise relationship between these infant health metrics and post-pregnancy earnings, alternative specifications are also considered. These include flexibly controlling for birth weight and gestational age by employing dummy variables or treating them as continuous variables. The use of flexible controls allows for non-linear relationships between birth weight, gestational age, and post-pregnancy earnings, providing a more detailed understanding of how different levels of these factors affect earnings outcomes. On the other hand, treating birth weight and gestational age as continuous variables allows an examination of the incremental effects of these health metrics on earnings, considering the full range of values within the sample.

Simultaneous effects of low birth weight and prematurity. I begin with the results of the regression in which low birth weight and prematurity dummies enter simultaneously. Online Appendix Table I.7 shows that low birth weight is the health condition at birth that drives the infant health penalty. Specifically, giving birth to a low-birth-weight baby is associated with a loss of C\$1,333 in average post-birth earnings, representing a 4% reduction relative to the mean earnings. This finding is consistent with recent studies suggesting that birth weight plays a more critical role in determining school age disabilities than any other health condition at birth, including prematurity (e.g., Elder et al. 2020).

Effects of different birth weight level. Online Appendix Figure H.3 plots the coefficients on indicators of 500-gram birth weight bins. Each dot gives the effect of birth weight in a specific bin relative to birth weight greater than 3,500 grams. It shows an overall increasing linear relationship between post-birth earnings and birth weight, with significantly lower earnings associated with lower birth weights. Specifically, mothers of children weighing less than 2,500 grams across any of the 500-gram bins earn on average C\$2200 less following childbirth. The gap is particularly larger for mothers of children weighing less than 1,500 grams at birth.

8 Conclusion

When it comes to assessing the long-term impact of birth weight or gestational age, most studies focus on children without paying much attention to their parents. In this study, I provide the first evidence of the influence of a child's health at birth on their mother's earnings trajectory. To do so, I take advantage of a unique data integration project that links tax records of mothers having given birth between 2006 and 2015 in Canada to vital statistics and parental educational data. The results are compelling: a child's health at birth significantly reshapes the economic dynamics of the family. Compared to mothers of children born at a healthy weight and gestational age, mothers of low-weight or premature infants earn less, participate less in the labor market, are more likely to be in the bottom quartile of the income distribution, and are less likely to contribute 40% or more to the family's total income in the years following the child's birth. Two key factors contribute to this earnings penalty. First, low birth weight and prematurity are associated with subsequent health challenges that impose additional caregiving constraints on mothers. Second, mothers of children with health issues often experience physical and mental health limitations, further restricting their earning capacity. However, the data used to support these conclusions present a significant limitation. I used disability tax credits as a proxy for health status that might excludes less severe health problems that hospital or medical expense records could capture. Despite this caveat, the results align with studies demonstrating a causal relationship between low birth weight and future disability (e.g., Eeles et al. 2022), especially that I find this condition is driving the penalty.

This study suggests that improving health conditions at birth could also be a powerful means of helping mothers cope with the challenges of motherhood. For example, the results indicate that for every 100-gram increase in birth weight – a feasible policy target – mothers earn approximately C\$100 more in post-birth earnings, on average.

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