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Peer Effects at Work on Parental Leave: Why is Papa Not More Involved?

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Peer Effects at Work on Parental Leave: Why is Papa not more involved ?

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Abstract

We use the 2006 Québec paternity leave reform to replicate Dahl et al., 2014 who estimate the peer effects of paternity leave taking among male co-workers. The Québec reform of the paternity leave system closely resembles the Norwegian 1993 reform they analyze. Using high-quality administrative data, we follow their birth-date regression discontinuity research design as closely as possible. Depending on the length of follow-up, we estimate that having a male co-worker take paternity leave increases the probability that a father of a new-born takes leave by 3-6 percentage points. These estimates are, however, imprecise and are therefore consistent with the 11 percentage point increase reported by Dahl et al., 2014. Crudely combining estimates from both papers suggests an effect size of 7.8 percentage points and a standard error of 3.4 percentage points.

1 Introduction

Mothers are much more likely than fathers to take time off work to care for a newborn and they remain on parental leave for much longer. Among the reasons are gendered social norms which reinforce behaviors in social groups through powerful causal peer effects. For

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instance, if one male co-worker decides to take paternity leave in an enviroment where few men take leave, it may encourage his colleagues to do so as well.

Credible convincing evidence on the presence and the strength of peer effects in parental leave taking decisions of fathers are however hard to come by. Even absent causal peer effects, the likelihood of individuals to take paternity leave increases with the share of co-workers that take paternity leave (Manski, 1993, Moffitt et al., 2001). Co-workers resemble each other along many dimensions because they sort themselves across firms and because they are exposed to similar conditions in the workplace that induce take-up. For both these reasons, employees working in the same workplace will exhibit similar patterns of paternity-leave take-up even in the absence of peer effects. Credible evidence on peer effects requires finding variation that can separate spurious correlations from causation.

In an important recent study, Dahl et al., 2014 (DLM hereafter) demonstrate how to fill this evidentiary gap. They leverage a policy reform that changes the incentives to take paternity leave using longitudinal administrative data on paternity leave taking and workplace networks. To estimate the causal effects peers exert in the workplace requires observing fathers to be exposed to peers that differ in their take-up of paternity leave for well-understood reasons external to the workplace itself. DLM use the 1993 Norwegian parental leave reform to generate this variation. They find that the decision of a co-worker to take paternity leave raises the propensity of one of his peers to take leave by 11-percentage points.[1] DLM thus find evidence for strong social effects in leave-taking at the work-place.[2]

In this paper, we do not break new methodological ground. Rather, we replicate DLM to provide a more robust, broad empirical basis to determine whether indeed peer effects are present in paternity leave taking. The National Academies of Sciences, Engineering, and Medicine define replicability as *obtaining consistent results across studies aimed at answering the same scientific question, each of which has obtained its own data.*[3] Because they employ the specifications set out in a prior paper in the literature, replication studies are less subject to p-hacking. In addition, if journals are willing to publish replication studies irrespective of the reported outcomes, such studies can help address the problem

[1]The standard error of this estimate is 4.3% and the mean take-up rate in this group is 67%. The reform was passed in parliament in December 1992 and implemented on April 1, 1993.

[2]They also show evidence from strong peer effects in family networks.

[3]National Academies of Sciences, Engineering, and Medicine, 2019, p.46

of publication bias, whereby only surprising or novel results are published. Finally, results from multiples studies employing similar specifications are easier to synthesize and thus contribute to the collaborative effort of science.

We replicate DLM using the 2006 parental reform in Québec that resembles the Norwegian reform in granting 5 weeks of parental leave exclusively to the partner in a couple that was otherwise not taking any leave following the birth of a child. For the vast majority of heterosexual couples this amounts to the father. To be eligible the birth had to fall after a cutoff date (April 1, 1993, in Norway and January 1, 2006, in Québec). These reforms thus lend themselves to a regression discontinuity set-up to induce variation in paternity leave take-up among peers to fathers whose children were born later.

Our results are qualitatively consistent with the main findings in DLM even though our point estimates are smaller. Following the specification of DLM as closely as possible, we obtain point estimates of the peer effect of 2.8 percent, about one-quarter of those reported in the Norwegian case. Unfortunately, however, our estimates are fairly imprecise with a standard error of 5.4 percent.

To summarize and synthesize the evidence from both studies jointly, we propose treating the main estimates as independent estimates of the same underlying parameter. Thus, combining our estimate of a peer effect of 2.8 percentage points with a standard error of 5.4 percent with the estimate from DLM of 11 percent with a standard error of 4.3 percent, we obtain a minimum variance estimate of 7.9 percentage points with a standard error of 3.4 percent.[4] Overall, we conclude that the two papers jointly provide strong evidence for the existence of sizeable peer effects in parental leave taking at the workplace level.

Despite our best efforts, there are some difference in the specification across studies in how geographic units are defined, which controls are available, and in the length of follow-up. We thus explore how robust our estimates are along these dimensions and find that they are robust. The estimates are also robust to shortening the follow-up to only 18 months rather than the follow-up of more than a decade in DLM and in our study. We consider this shorter follow up to provide a baseline for a future replication study that uses 2019 parental leave policy reform in Canada which mimics the Québec reform of 2006.

[4]The estimate is obtained using the weighted average of the two estimates with a weight of $\theta = \frac{0.043^2}{0.054^2+0.043^2}$ placed on the estimate provided in this study. The variance of the joint estimate is the $\theta^2 * V_{DL} + (1-\theta)^2 * V_{DLM}$ where V_{DL} stands for the variance of our estimate and V_{DLM} for the variance of DLM.

Once data up to 2022 has been made available by Statistics Canada, we will be able to replicate this specification. The current paper thus informally serves to pre-register this future analysis.

Finally, we explore evidence for peer-effects in alternative networks. Contrary to DLM, we can not estimate peer effects in family networks. However, we can estimate peer effects using spousal workplaces to define the peer effects.[5] The social relationships are established along two dimensions: at the family level (e.g., husband and wife) and at the workplace (male co-workers of the wife), using the social structure of the household as in De Giorgi et al., 2020. The estimates indicate a peer effect of 4.5 percentage points with a standard error of 5.6 percentage points.

The remainder of the paper proceeds as follows. We begin in Section 2 by introducing the identification strategy and main specification employed by DLM. Our specification mimics their specification as closely as possible but we point out some discrepancies that arise. Section 3 then describes the Québec parental leave reform as well as the data that we use for our empirical analysis. Section 4 contains the main empirical results of our replication study and compares our estimates with those from DLM. Section 5 extends the empirical analysis by first presenting results from alternative specifications that probe how fragile the empirical findings in our study are. In this section, we then broaden the analysis and consider the male co-workers of spouses as the reference group for the father. Finally, Section 6 concludes by reflecting on what we have learned about the existence and magnitude of peer effects in paternity leave taking from the combination of DLM and our study.

2 Identification Strategy and Estimation Specification

2.1 Identification Strategy

Endogenous group membership, the presence of correlated unobservables, and the reflection problem make identifying social interactions challenging (Manski, 1993). To address these challenges, DHL exploit a Norwegian reform that extended an extra month of paid parental leave explicitly to the second parent/care-taker. Since parental leave is traditionally pre-dominantly taken by mothers, this meant that fathers of children born after

[5] Again, we will be able to replicate these estimates using the data from the Canadian reform to become available in a few years.

April 1st 1993 are eligible for an extra month of paid parental leave. This sharp cut-off in eligibility by birth-date of the child introduces a regression discontinuity that can be used to estimate peer effects in take-up decisions.

The empirical specification is given by equations (3) and (4) in DHL and reproduced here:

$$y_{1,g} = \alpha_1 + \mathbb{1}(t \geq c)(g_l(t-c) + \lambda) + \mathbb{1}(t < c)g_r(c-t) + e_{1,g} \tag{1}$$

$$y_{2,g} = \alpha_2 + \beta y_{1,g} + \mathbb{1}(t \geq c)f_l(t-c) + \mathbb{1}(t < c)f_r(c-t) + e_{2,g} \tag{2}$$

Here, g indexes the peer group. The variables $y_{1,g}$ and $y_{2,g}$ are indicator variables for parental leave taking of two fathers. The first equation describes the parental leave taking decision of a set of fathers that we call peer fathers. These are indexed with 1. Peer fathers were eligible for paternity leave if their child was born on date t subsequent to the cut-off c. The parameter λ represents the causal effect of being eligible for the extra month of paternity leave on the parental leave take-up decision of fathers. It can be estimated using a standard RD regression. The unknown functions $g_l(), g_r()$ are to be estimated and they control for variation in leave taking in the difference of the birth date from the cutoff date of the reform.

The second equation describes the parental leave taking decision of a set of father we call index fathers. Index father are linked to peer fathers by virtue of working in the same workplace at the time of the reform. Index fathers had a child subsequent to the peer fathers. All of them were thus eligible for taking paternity leave. Their decision to take paternity leave is influenced by the parental leave decision of the peer father. In particular, if his peer took parental leave then the propensity of the index father increases by the peer effect β. The functions $f_l(), f_r()$ are unknown and, crucially, depend on the birth-date of the peer's child. The parameters α_1 and α_2 depend on a set of controls which we describe below. The leave taking decision of both set of parents are subject to random influences captured by $e_{1,g}$ and $e_{2,g}$ respectively.

To identify the causal peer effects, we rely on variation in paternity leave take-up among peer fathers induced by the parental leave reform. We use a regression discontinuity approach based on the birthdate of newborns in the peer sample. Intuitively, this approach amounts to defining a treatment and a control group by whether or not the peer fathers were exposed to the reform themselves. We can think of the treatment group as those

index fathers with a peer whose newborn was born close to but just after the time the reform came into effect. The control group consists of fathers whose peers had newborns close but just before the cutoff date. The identifying assumption is that the timing of births among peer fathers around the reform date is orthogonal to correlated and contextual factors that might affect decisions of peer and index fathers.

Figure 1 illustrates exposure of index fathers to treated peer fathers can be used to identify the causal effect of peer behavior on taking paternity leave.

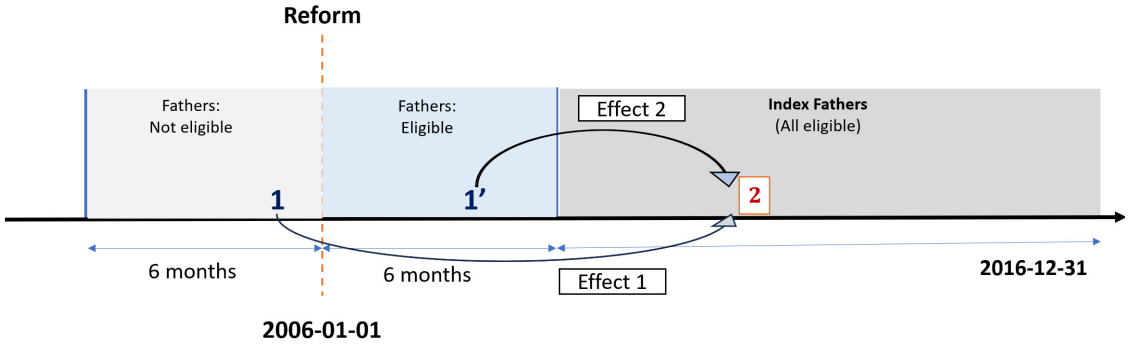


Figure 1: Illustration of the identification strategy

Note Father **1**, who had his first child during the six months before the reform date, is not eligible, while Father **1'** is eligible for paternity leave. All Index Fathers **2** are eligible. The difference of take up between Fathers **1** and **1'** represents the effect of reform on parental leave take-up (equation (1)). The difference between an index fathers **2** linked to treated and untreated fathers (**1** and **2'** respectively) scaled by the effect of the reform on peer fathers itselfs identifies the peer effects. This effect is estimated using specification (2).

2.2 Estimation Specification

We follow the main specification employed by DHL as closely as possible. These authors control for marital status, a quadratic in the age of the father and mother, the gender of the new-born, an indicator for missingness of spousal age and marital status, the firm-size and the county of residence as well as the years of education of the father and the mother. Unfortunately, our dataset does not include parental education. We also do not have access for the county of residence as the exact equivalent does not exist in Québec. However, we control for the city where the employer's headquarters are located.

The functions $g_l(), g_r(), f_r(), f_l()$ are linear in $t-c$ and we follow DHL in using a donut regression discontinuity, omitting peers (and linked index fathers) if the birth was within a week of the policy date. We weight the data using a triangular kernel and use fathers within 6 month of the policy date to define the peer fathers. As index fathers, we consider

male co-workers of peer fathers who were employed in the same enterprise at the time of the reform and had their first child subsequent to the births of the peer fathers (see Figure 1). Our analysis is restricted to those working in firms with fewer than 500 employees. Furthermore, our sample is limited to those with only one birth in the peer group within six months of the policy date (See table 2 for the details on the sample restriction). All these choices follow DHL closely.[6]

3 Data construction and Policy Environment.

3.1 Data sources.

We use the Canadian Employer Employee Dynamics Database (CEEDD) which draws on income tax files. These are (i) the T1FF files with the information from the personal income tax filed annually including a family declaration, (ii) the T4-files filed by employers annually recording their employees earnings and (iii) the Record of Employment (ROE) that employers are required to file when a worker separates. The ROE include the reasons for separation among which are parental leave taking. Our data covers the period from 2001 to 2016.[7] Hou et al., 2017 provide a comprehensive overview of the primary surveys and administrative data used to investigate parental leave in Canada.[8]

The T1FF file covers all individuals who filed a T1 tax return or who received federal child benefits. The file also includes information on non-filing family members (spouses and children). We use family identifiers link parents' files with newborn in each calendar year. The resulting data includes family characteristics (such as family composition, family income, province of residence, and spousal information), individual attributes (such as birth date, and gender), as well as information on newborns (including the birth-gender and the precise date of birth).

The Record of Employment (ROE) includes details of all employment separations

[6] We thank DHL for making their code available, which allowed us to resolve ambiguities about the specification used. The code is available on : the webpage of the AER.

[7] At the time of writing, the data available through the CEEDD run through 2019, but at the time we filed our application to Statistics Canada, the final year was 2016.

[8] **i. Canada Household Surveys**: *EICS, the General Social Survey (GSS) on Family, the National Longitudinal Survey of Children and Youth (NLSCY), and the 2010 Survey of Young Canadians (SYC)*;

ii. Administrative data sources: *Record of Employment - ROE.*

between employers and employees, including the specific reasons for the separation and the expected date of leave. One notable reason captured in the ROE is maternity, and paternity/parental leave, which we exploit.

Employers are required to file a T4-tax form for each employee on an annual basis, which includes employee earnings. To enrich the dataset, we linked the T4-tax file with the NALM (National Accounts Longitudinal Microdata) file. The NALM file contains valuable workplace characteristics such as location, multi-establishment status, sector of activity, value-added, and among others.

We merged the parents' file from T1FF with the parental leave file from ROE, along with the T4-NALM file that provides workplace characteristics. Identifying the workplace of each parent was essential for estimating peer effects within the workplace. If, in a given year, an individual worked for more than one firm, we retained the main job with the highest annual earnings.

3.2 Policies on Parental Leave in Canada

In Canada, parental leave benefits are administered through the Employment Insurance (EI) program. Eligible parents receive with financial support during their leave period to offset some of the earnings losses incurred when taking time off work to care for their children. The primary goal of parental leave policies is to assist working parents in achieving a balance between their employment and family responsibilities. Table 1 presents an overview of the historical developments in these policies, highlighting key changes.

Parental leave was introduced in Canada in 1971, allowing mothers to claim up to 15 weeks of unemployment insurance benefits for a period of 17 weeks surrounding the birth or adoption of a child (Table 1, Row 2). To be eligible for this benefit, women needed to have worked for at least 20 weeks. As attitudes towards parenting evolved, parental leave policies became more generous. In 1990, the Canadian federal government expanded the policy by introducing a shared parental leave benefit of 10 weeks, which could be shared by parents in whatever way they desired. This change provided greater flexibility in taking parental leave and recognized the importance of both parents' involvement in the care of their children. In 2000, parents became eligible to take up to one year off work after the birth or adoption of their child.

On January 1, 2006, the Québec Parental Leave Insurance Plan (QPIP) replaced the federal system in Québec, which remained in place in the rest of Canada. This brought

changes to both the eligibility criteria and the replacement rate of earnings. The QPIP offers parents the option to choose between a basic plan and a special plan. The parental leave period under the basic plan is somewhat longer while the replacement rate is lower than under the special plan. Under the basic plan, the mother could receive up to 50 weeks of benefits as indicated in column 1 in table 5 (18 weeks for maternity + 32 weeks for parental). In addition, the basic plan provides for 5 weeks of paternity leave. The table 5 indicates the maximum number of benefit weeks and the percentage of average weekly earnings for each type of benefit (basic or special plan).[9]

On March 17, 2019, the federal government of Canada reformed the federal system still in place outside of Québec to provide for an additional five weeks of parental leave.[10] However, one parent cannot take more than 35 weeks of parental leave. Given that mothers predominantly take at least 5 weeks of parental leave, this reform de facto acts to provide 5 weeks of paternity leave.

Overall, the progression of parental leave policies in Canada highlights the ongoing efforts to support working parents and promote family-friendly workplaces. It recognizes the value of providing parents with the opportunity to take leave to care for their children without sacrificing their financial security, ultimately fostering a healthier work-life balance for families.

[9]For couples who adopt one or more children, they can freely share the benefits between them. The number of adoption benefit weeks is determined depend on the choice of plan. For same-sex couples, both parents are entitled to parental leave, provided that the relationship between the child and the parent has been established in the birth certificate or the adoption judgment.

[10]see (https://www.canada.ca/en/employment-social-development/campaigns/ei-improvements/parent-sharing.html)

Table 1: Parental leave policies in Canada

Dates	Location	Eligibility	Benefit rate	Maternity	Parental Leave	Paternity[a]
1971	Canada	20 weeks	55%	15 weeks	0	0
1990	Canada	700 hours	55%	15 weeks	10 weeks	0
2000	Canada	600 hours	55%	15 weeks	35 weeks	0
January 1, 2006	ROC	600 hours	55%	15 weeks	35 weeks	0
	Québec [b]	CAD 2000	**70%**	18 weeks	32 weeks	**5 weeks**
March 17, 2019	ROC [c]	600 hours	55%	15 weeks	35 weeks	5 weeks
	Québec [b]	CAD 2000	70%	18 weeks	32 weeks	5 weeks

[a] We refer to leave available only to the second parent if the primary leave-taker maximizes the parental leave as "paternity leave' reflecting the fact that this predominately applies to fathers.

[b] Québec Parental Leave Insurance (QPIP), parents have two choices: basic plan and special plan.More details in table 5.

[c] The reform in March 2019 designates that parents can allocate 30 weeks freely across parents. An additional 5 weeks are available for the partner taking less leave overall. In practice, this amounts to allowing for 5 weeks of paternity leave, since mothers are typically those taking the majority of leave.

Our analysis primarily focuses on the Québec Parental Leave Insurance Plan (QPIP) implemented in January 2006. This plan has significantly reduced the financial burden associated with taking parental and paternity leave, as demonstrated in Figures 2 and 3.

Under the QPIP, the weekly benefit amount and the duration of leave depend on the chosen plan (see Table 5 of Appendix A for more details). With the basic plan, fathers can receive up to 37 weeks of leave (5 weeks for paternity leave and 32 weeks for shared parental leave). During the 5 weeks of paternity leave and the first 7 weeks of shared parental leave, fathers receive 70% of their earnings. Afterward, they receive 55% of their earnings for up to 25 weeks. Furthermore, the QPIP raised the cap on benefits from CAD $39,000 under federal system to CAD $57,000.

To illustrate benefits, consider a father has an annual income of CAD $80,000 (approximately CAD $1,538 per week). Under the basic plan, this father would receive CAD $1,077 for the first 12 weeks and CAD $846 thereafter.[11] The special plan provides a

[11] We chose CAD $80,000 as an example to illustrate that reaching the maximum benefits is challenging. This amount is significantly higher than the average annual salary in Québec, which is $47,000 per year.

higher replacement rate, with 75% of weekly earnings during the 3 weeks of paternity leave and up to 25 weeks of shared parental leave. Assuming an annual employment income of CAD $80,000, this amounts to a weekly benefit of CAD $1,154 compared to CAD $846 (55% of weekly earnings) prior to the reform.

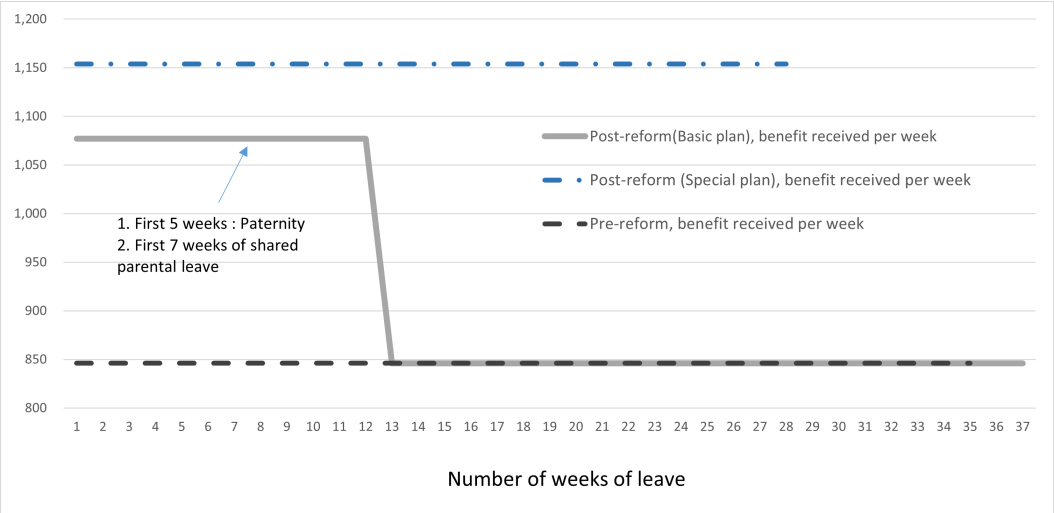


Figure 2: Benefits paid before and after the reform for typical father.

Note: The benefit plan determines the maximum number of weeks that you are entitled to receive benefits, as well as your income replacement rate (QPIP). The benefit calculator is available online https://www.rqap.gouv.qc.ca/en/about-the-plan/benefit-calculation-simulator

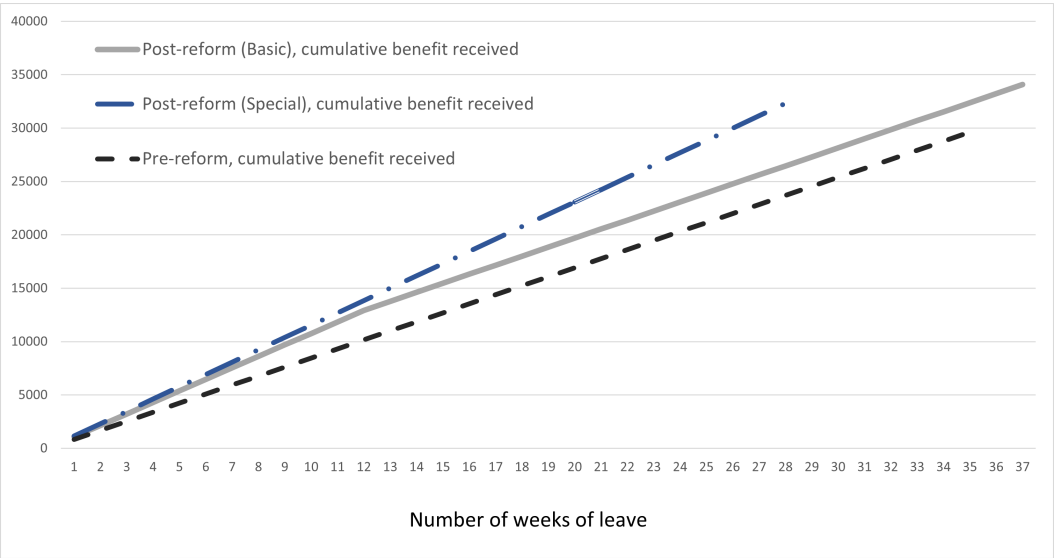


Figure 3: Cumulative parental leave benefit received

Source: This graph represents the cumulative benefits received by a parent with an annual income of CAD $80K conditional on either the basic or special plan. Benefits are calculated as a percent of average weekly earnings. After the reform, an eligible parent can receive up to CAD $57K while before the reform the maximum amount was CAD $39K.

3.3 Measuring Leave-taking

The final step of the process involves identifying parental leave by using information from the record of employment (ROE) provided by the employer. One of the reasons for a separation provided for by the ROE is parental (and maternity) leave. To apply for parental leave benefits, parents must inform their employers of their intention to take leave. Subsequently, the employer submits a record of employment to the Service Canada Office, indicating the reason for the temporary separation and the duration of the leave between the employee and the employer. In Quebec, parents who became eligible for benefits after 2006 need to submit their own application for Quebec Parental Insurance Plan (QPIP) benefits.[12] They are also required to specify the desired timing for receiving their benefits. Prior to 2006, parents were required to submit the application form to Service Canada, in addition to the record of employment provided by their employer.[13]

3.4 Descriptive Statistics and Sample Restrictions

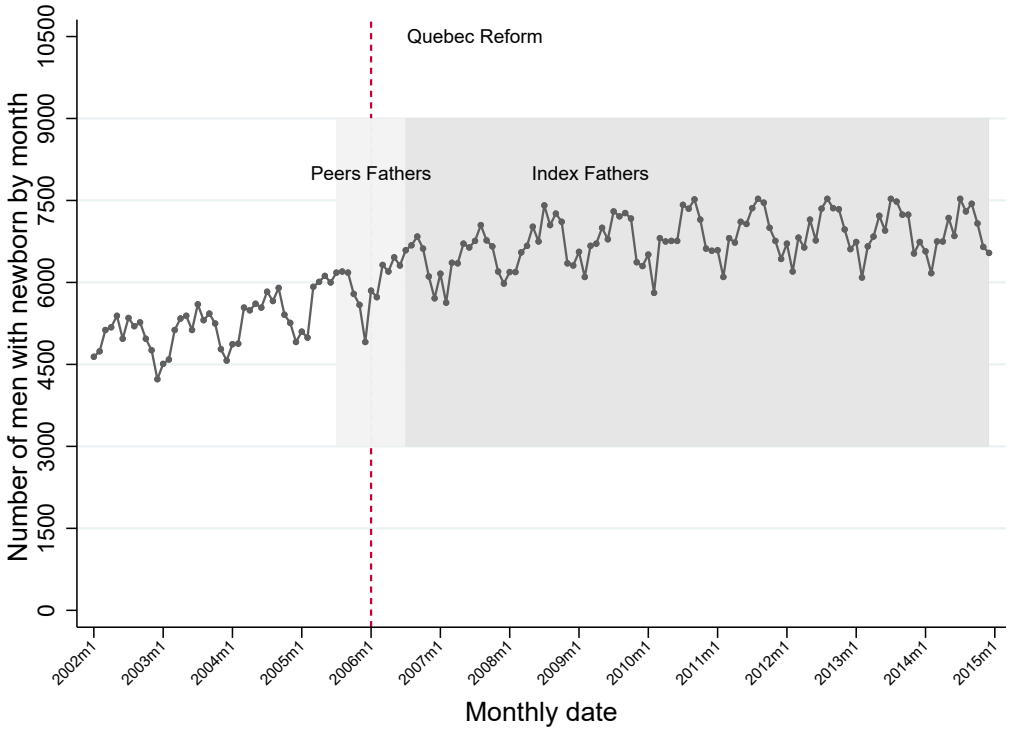
Figure 4 shows the number of fathers with newborns each month in our data. This number increased from 2002 to 2016 from about 5,000 monthly in 2002 to around 7,000 monthly in 2016. [14]

[12]The management of the Québec Parental Insurance Plan is entrusted to the Conseil de gestion de l'assurance parentale (CGAP). The CGAP acts as the administrator for the self-sustaining Parental Insurance Fund, which provides the necessary financial resources for the Plan.

[13]Even after the reform, firms must complete the Record of Employment (ROE) indicating the separation from the employer for a short or long period. From January 2006, many new fathers located in Québec have been classified in the "Unknown" category for the reason of the separation in weeks to childbirth.

[14]Our sample includes only those firms that recorded a single birth within the reform period, i.e those with just one peer father at the workplace. Table 2 illustrates the process of successive sample restrictions, from the full dataset to the final sample.

Figure 4: Number of New Fathers

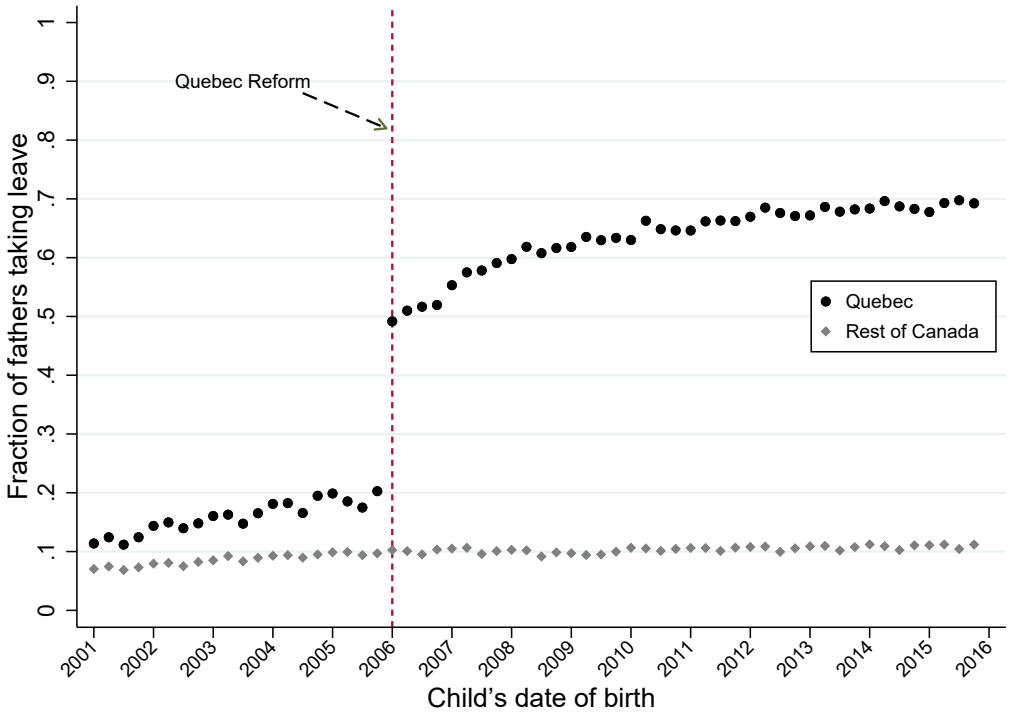


Notes The Figure shows the number of men with newborns in Québec between 2002 and 2015. New fathers of children born in the 6 month surrounding January 1, 2006 are call peer fathers. Fathers with children subsequently are called index fathers. Further sample restrictions are described in the text.

Figure 5 shows that the fraction of fathers taking parental leave increased from 20% to approximately 50% immediately after the reform was implemented (1 January 2006). The variation right around January 1, 2006 provides the variation at the heart of our identification strategy, as discussed in Section 2.1. The most important feature of the reform is to introduce paternity leave (see Patnaik, 2019). In addition, the reform made parental leave overall more attractive. First, QPIP introduced a more accessible earnings threshold, allowing parents with a minimum of CAD 2,000 in insurable earnings to qualify. Second, QPIP raised the replacement rate from 55% to 70% and the maximum earnings cap (from CAD 39,000 to CAD 57,000 in 2006), thereby broadening the financial support available during parental leave. Over the following ten years, the uptake rate for parental leave among eligible fathers steadily increased, reaching 70 percent by 2016. Meanwhile, in the Rest of Canada, the percentage of fathers taking leave, which is around 10%, remained almost unchanged during the period, with no reforms affecting parental leave.[15]

[15]As discussed above, in March 2019, Canada introduced the Parental Sharing Benefit. as part of an effort to promote greater gender equality and encourage both parents to participate more equally in child-rearing: we do

Figure 5: Leave Taking among New Fathers



Note: The figure shows how the fraction of new fathers taking any parental leave as identified in the Record of Employment varies with the month of birth of their children.

As the QPIP increased the replacement rate of benefits and introduced a more accessible threshold, we analyze the immediate impact of QPIP on parents' characteristics to ensure that the groups before and after the cutoff are balanced in terms of their characteristics. The observation includes all individuals who gave birth during the year. Figures 6 shows the participation rate in the pre-birth year. There is no significant change for females and males in both Québec and the rest of Canada around the time of the Québec parental leave reform implementation.

not yet have the data to evaluate the effect of this reform applicable in the Rest of Canada.

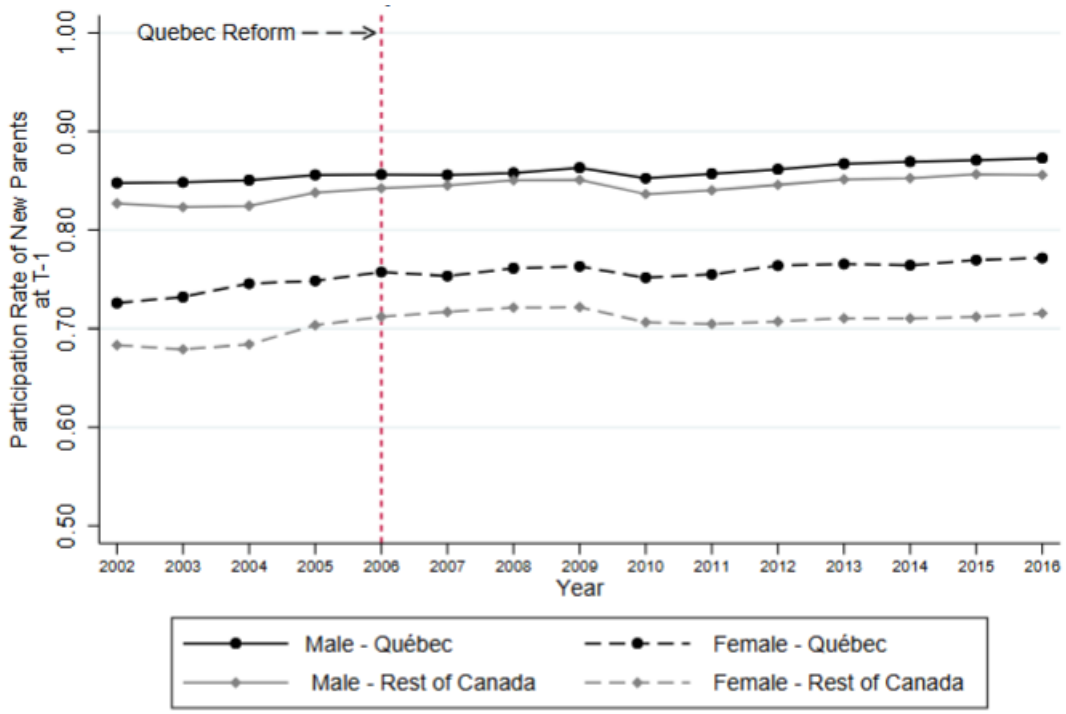


Figure 6: Participation Rate of New Parents

Note: This figure illustrates the annual participation rate in the year prior to childbirth for both females and males in Quebec and the rest of Canada. The participation rate is calculated based on earnings of at least CAD 2,000, adjusted to constant 2002 dollars.

In Figure 6, we observe that the labor force participation rate of females in the rest of Canada is noticeably lower compared to Québec. This difference may be attributed to the difference in childcare costs (Baker et al., 2008; Powell, 1997). On September 1st, 1997, the government of Québec initiated a new child-care policy, which accredited and regulated childcare facilities offering subsidized daycare ($5.00 per day per child). The universal child-care reform would have helped many parents in the province to balance work and family life, thereby supporting higher participation rates. However, the participation rates of men in Quebec and the rest of Canada do not show significant differences, suggesting that factors influencing female participation—such as childcare affordability—may not affect male participation in the same way. This highlights the need for further analysis on how gender expectations and the availability of parental leave policies specifically impact women's participation rates.

Table 2 presents sample restrictions and summary statistics for the full dataset, progressively narrowed down to the main analysis sample. Our selection criteria mimic those in DHL. There are 62,230 births that fall in the period used to define peer fathers and

850,810 births from July 2007 to December 2016. Among the 555,000 potential index fathers, 448,570 had their first child after the reform. Of these 399,640 were employed. There are 162,640 index fathers had at least one peer who gave birth around the time of the reform. Of these, we selected the 74,330 who worked in a small firm with less than 500 co-workers on January 1, 2006. Finally, we limit ourselves to the 36,770 with only one peer father in the data. The table shows average age, annual earnings in the pre-birth year, the fraction of legally married individuals, the fraction of migrants, and the spouse's participation rate in the labor market as we progressively tighten the sample restrictions. It is noteworthy that the only characteristic that has changed significantly is the fraction of migrants. In the full dataset, the fraction of migrants is 24%, but in the final restricted sample, it drops to only 12%. We investigated potential changes in spouses' labor market participation as this could be a determining factor in the uptake of parental leave by husbands. It was observed that the proportion of spouses participating in the labor market at the pre-birth year is 72% for the full data, which increased to 82% for the final sample.

Table 2: Sample Selection and Summary Statistics

	Obs	Avg Age	Earning at t-1	% of Married	% of Migrants	Spouse PR (pre-birth year)
All births (July 2005 - June 2006)	62,230					
All births (July 2007 - December 2016)	850,810					
Index Fathers with newborn (July 2007 - December 2016)						
Number of Index fathers	555,000	32.81	33,510	39	24	72.20
First Child Birth (Index fathers)	447,570	32.35	33,110	38	25	73.10
Employed index fathers	399,640	32.11	36,220	36	22	75.80
At least one peer father	162,640	32.66	39,000	36	23	78.50
Less than 500 co-workers	74,330	31.85	33,930	31	21	77.20
Only one peer	36,770	31.71	36,460	26	12	81.90

Note: The top two rows show the number of births in the "potential" peer and index period with summary statistics for the raw, unselected sample. The bottom of the table shows the summary statistics as sequentially more and more restrictions are imposed. The final row shows the main analysis sample. Observation numbers are rounded to the nearest 10.

4 Results on Peer Effects

We can now turn to estimate equations 1 and 2 following DHL as closely as possible. The main results are obtained using 2SLS using the policy dummy from the peer regression discontinuity as the instrument. DHL controls for linear functions of age on either side of the cut-off combined with a one-week donuts surrounding Jan 1st. DHL employ a triangular kernel down-weighing those observations with peer-births far from the cut-off. We follow them in this (see table 3 notes), but we can not include polynomials in parental education and our geographic controls do not map neatly into the Norwegian counterpart. To align as far as possible with DHL, we use the city of the employer headquarters as our location controls.

Figures 7 and 8 show paternity leave take up relative to the running variable, date of birth of children of peer fathers around Januar 1st 2006. Figure 7, displays the fraction of peer fathers taking any paid leave within a one-year window around the reform. The reform significantly increased take-up among peer fathers, rising from 15 percent to 39 percent. The effect of eligibility among peers on the decision to take leave among the index fathers is much less obvious in Figure 8. The reduced form suggests a small increase in the propensity to take leave when a peer-worker was just eligible due to a birth shortly after January 1st, 2006.

In addition to examining peer effects operating through workplace network of new fathers, we also consider as an alternative network the spouse's male co-workers. Figures 9 and 10 show the parental leave uptake rates among the spouse's male co-workers (peer fathers) and index fathers, respectively, in relation to the birthdates of their colleagues around the time of the reform.

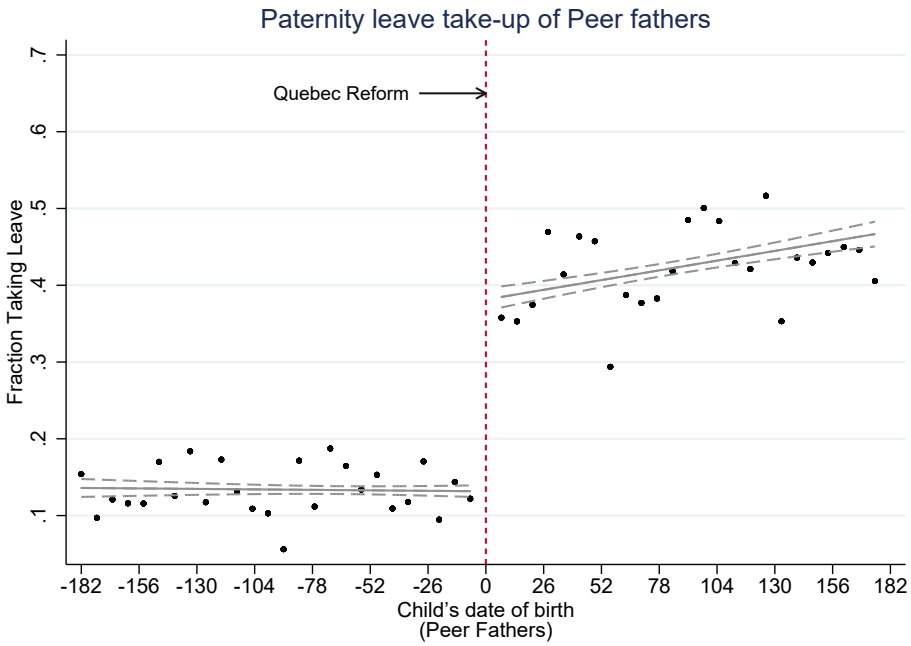


Figure 7: Parental leave take up-rate among peer fathers (weekly)

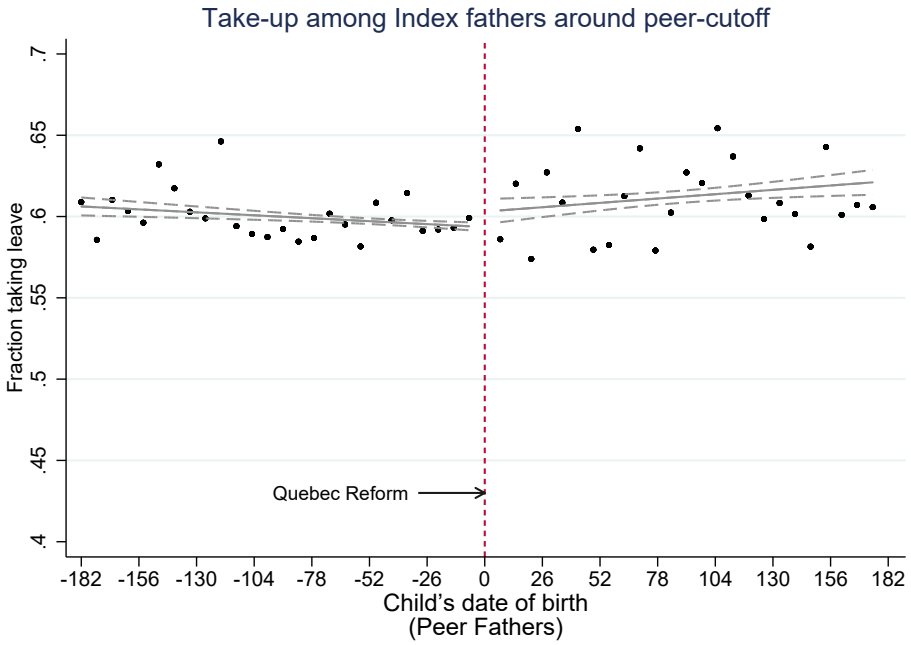


Figure 8: Parental leave take-up among index fathers (relative to peer birthdates around the reform).

Note: Each observation is the average number of peer fathers taking paternity leave in one week bins (top panel) or two-week bins (bottom panel), based on the birth-date of their child. In each figure, the dashed vertical lines shows the reform cutoff of January 1, 2006 (normalized to 0). The estimates are in Table 3.

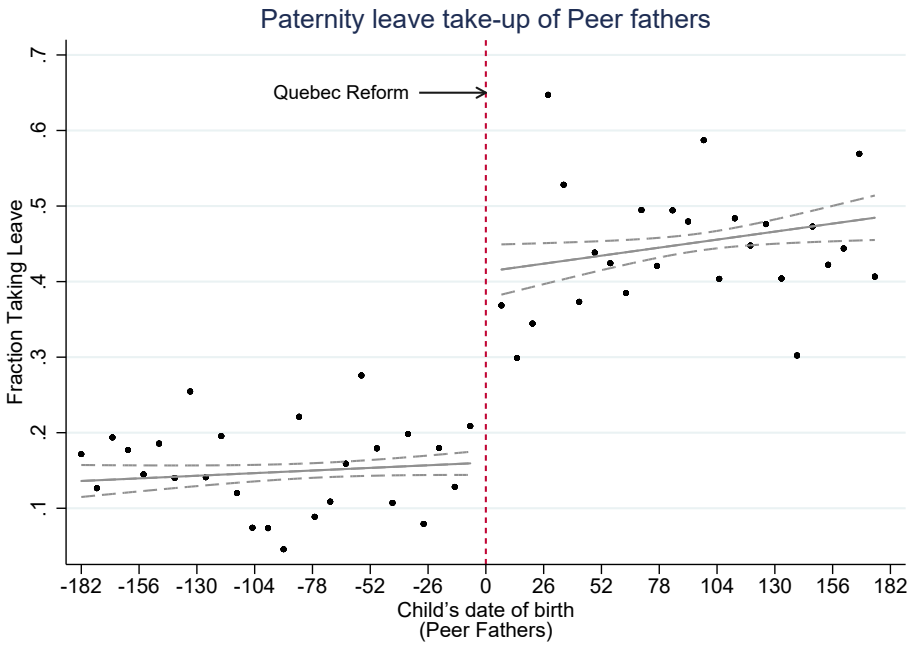


Figure 9: Parental leave take up-rate among peer fathers (weekly)–spouse's colleagues

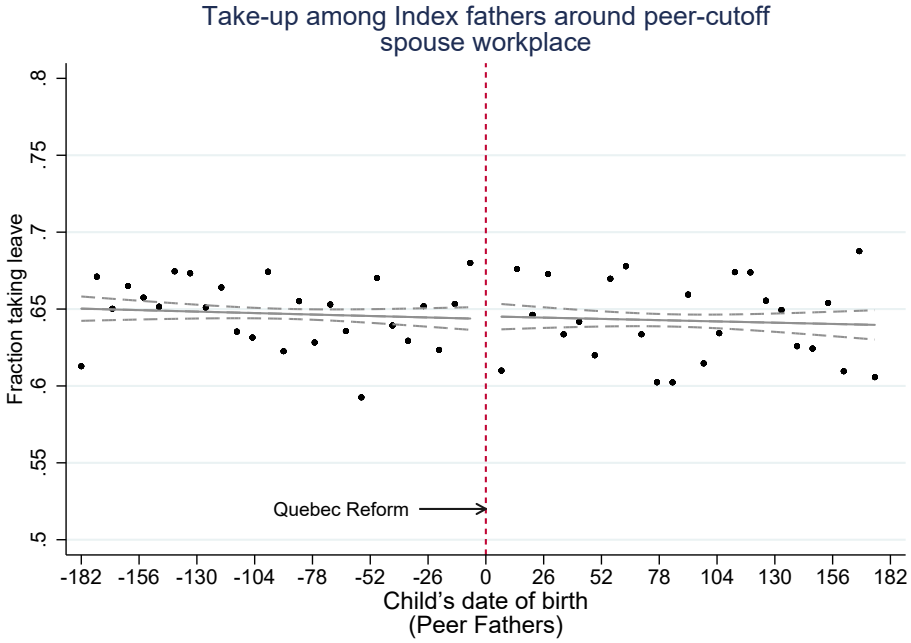


Figure 10: Parental leave take-up among index fathers (relative to peer birthdates around the reform).

Note: Each observation is the average number of peer fathers taking paternity leave in one week bins (top panel) or two-week bins (bottom panel), based on the birth-date of their child. In each figure, the dashed vertical lines shows the reform cutoff of January 1, 2006 (normalized to 0). The estimates are in Table 4.

The two-stage results cannot be simply represented using a figure. However, the effect size should, except for the presence of controls, equal to the ratio of the reduced form to the first-stage effect. Figure 7 suggests a first stage effect of about 0.25. Thus, even though the point estimate of the reduced form is small, the 2SLS estimates could still be sizable.

Table 3 shows the estimates of the first stage, the reduced form, and the 2SLS for the main specification in row one of Panel A. For reference, Panel C reproduces the estimates reported by DHL. Our estimated first stage effect is smaller than that in DHL but approximately equally precisely estimated. We also have a weaker reduced form effect. The precision of our estimate is similar to that in Norway. However, since our reduced form estimate is only about half the size of the Norwegian, we cannot reject the absence of a treatment effect on index fathers on the basis of our estimates.

Finally, the 2SLS estimate of 0.03 with a standard error of 0.054 summarizes the result of our replication study. The point estimate is consistent both with the estimate of 0.11 from DHL, but this estimate is sufficiently imprecise to also be consistent with a zero or even a sizeable negative peer effect.

Table 3: Regression Discontinuity Estimates of the Effect of Eligibility on Take-up of Leave

	First Stage	Reduced form (ITT)	Second stage (2SLS)	Obs
	(1)	(2)	(3)	(4)
Panel A: *Follow-up of Index Fathers from July 2006-December 2016*				
				(Rounded at 10)
Main Specification	0.255***	0.0071	0.028	36,760
	(0.028)	(0.014)	(0.054)	
No Location Fixed Effect	0.267***	0.008	0.028	36,760
	(0.028)	(0.014)	(0.052)	
No controls	0.267***	0.010	0.039	36,760
	(0.028)	(0.015)	(0.054)	
Panel B: *Follow-up of Index Fathers from July 2006-December 2008*				
				(Rounded at 10)
Main Specification	0.276***	0.017	0.063	10,360
	(0.016)	(0.012)	(0.044)	
No Location Fixed Effect	0.281***	0.015	0.053	10,360
	(0.016)	(0.013)	(0.044)	
Panel C: *Gordon B. Dahl, Katrine V. Løken, and Magne Mogstad 2014.*				
				(Not rounded)
Main Specification	0.317***	0.035***	0.110***	26,851
	(0.026)	(0.013)	(0.043)	

Notes: The regressions use the main specification following DHL (called "*Main Specification*" in the table). The specifications use daily data and exclude births that occurred in one-week windows on either side of the reform cutoff. Similar to DHL, we incorporate separate linear trends in birth day on each side of the discontinuity and employ triangular weights. The control variables are father and mother age and squared age, marital status at the year of the birth, an indicator for the gender of the child, and the city location of the firm while DHL use the location of the father. As we focus on firms with fewer than 500 employees, the location of the headquarters and the location of employees often are the same. However, we do not have information on the education of the father and mother, which DHL included as a control variable.

***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

Finally, we present results from a variety of other specifications. First, we show two specifications varying the set of controls motivated by our inability to precisely mimic the specifications in DHL. We estimate one specification without location fixed effects

motivated by the observation that our geographic units do not map neatly into the counties used in DHL. And, our set of controls necessarily differs from theirs as we do not have information on parents education. Thus, we also present results obtained without any controls. Our findings are robust across these changes and the variation in estimates does not affect our conclusions.

5 Peer Effects Using Alternative Networks

Having presented the main results regarding the influence of fathers' co-workers in the previous section, we now turn our attention to the impact of spouses' male co-workers on fathers. We identify the spouses' male co-workers as the peer group for the husbands. As the workplace functions as a social space, behaviors and norms observed by the spouse, such as attitudes towards paternity leave, are communicated to the husband. This transmission of information can significantly influence the husband's perceptions and decisions regarding paternity leave. Table 4 presents the estimates for the influence of spouses' male coworkers on husbands.

Table 4: Peer Effects Using Spouse's Workplace

	First Stage	Reduced form (ITT)	Second stage (2SLS)	Obs
	(1)	(2)	(3)	(4)
Follow-up: July 2006-December 2016				
				(Rounded at 10)
Main Specification	0.321***	0.014	0.045	18,990
	(0.045)	(0.018)	(0.056)	
No Location Fixed Effect	0.312***	0.016	0.050	18,990
	(0.050)	(0.018)	(0.057)	
No controls	0.309***	0.018	0.058	18,990
	(0.053)	(0.018)	(0.059)	

Notes: The "*peer fathers*" refers to the male colleagues of the spouse.

***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

As shown in Figure 9, there is a notable increase in the uptake of paternity leave among

the spouses' male coworkers (first stage). Column 1 of Table 4 indicates the magnitude of this first-stage effect, showing an increase of 32 percentage points—slightly higher than the estimate observed for the husband's coworkers, which is 25 percentage points. Column 2 reports the ITT estimates corresponding to Figure 10, which indicate that the spouse's coworkers increase paternity leave by 1.4 percentage points. This results in a second stage estimate of 4.5 percentage points. Lack of precision however does not allow us to conclude that spouse's male coworkers significantly influence the husband's decision to take paternity leave.

6 Conclusion

How then do we synthesize what we have learned from the two studies together? One way to do this is to assume that both provide independent estimates of the same parameter. Imposing this assumption, we obtain a point estimate using the minimum variance combination of the two estimates. This point estimate is 0.079 with a standard error of 0.034, suggesting an economically strong peer effect. However, since our estimate is substantially lower than that in DHL, the 95% confidence interval associate with this combined estimate is smaller and covers less sizeable estimates than that obtained by DHL. The lower bound of the 95% confidence interval decreases from 0.024 to 0.011 while the upper bound decreases from 0.196 to 0.145.

Unfortunately, the uncertainty in the estimate from our replication study is large enough so that the estimated range for the peer effect parameter shrinks only moderately. We thus see the main benefit from our replication study to come from obtaining an independent estimate not subject to concerns related to p-hacking or publication bias. We believe that this study will serve us well in providing the basis for a follow-up study using the 2019 reform in Canada. As the population of the rest of Canada is about four times the size of the population of Qu'ebec, we anticipate these estimates to be significantly more informative.

Overall, the estimates presented here combined with those in DHL provide credible evidence for the presence of peer effects in parental leave take-up decisions at the workplace level.

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A Appendix A

The table 5 outlines two plans: the Basic Plan and the Special Plan. The Special Plan offers a high replacement rate for a shoter duration while the basic plan offers longer duration of leave with relative lower replacement rate. This arrangement offers flexibility, enabling parents to choose a plan that best suits their financial needs and caregiving preferences.

Table 5: Parental leave benefits in Québec

Type of Benefits	**Basic Plan**	**Special Plan**
Maternity (non-shareable)	18 weeks 70% of earnings	18 weeks 75% of earnings
Paternity (non-shareable)	5 weeks 70% of earnings	3 weeks 75% of earnings
Parental (shareable)	32 Weeks First 7 weeks: 70% of earnings Next weeks: 55% of earnings	25 weeks 75% of earnings
Adoption (shareable)	37 weeks First 12 weeks: 70% of earnings* Next 25 weeks: 55% of earnings*	28 weeks 75% of earnings*
Insurable income	Up to CAD 57,000	Up to CAD 57,000

Source: Québec Parental Insurance Plan: the maximum insurable earnings that parent can claim increase from CAD 39,000 before the reform to CAD 57,000 in 2006.