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Labour supply responses to paid parental leave

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Labour supply responses to paid parental leave*

by

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Abstract

Women account for the majority of parental leave take-up, which is likely one of the major reasons for the gender gap in income and wages. Consequently, many countries exert effort to promote a more gender equal division of parental leave. Indeed, the last decades have seen an increase in fathers' take-up of parental leave benefits, but the gender earnings gap has remained fairly constant. In this paper we re-evaluate the labour supply responses of both mothers and fathers to three major reforms in the Swedish parental leave system, recognizing that take up of paid parental leave might not fully reflect actual time off from work in a system where job-protection exceeds paid leave. We find that both mothers and fathers decreased their labour supply to the same extent as a response to an increase in paid parental leave without gender restrictions. In contrast, we find no support for any changes in fathers' labour supply due to reforms introducing gender quotas in paid leave.

Keywords: natural experiment, parental leave, labour supply

JEL-codes: J13, J48, J16, J22

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1 Introduction

The unequal gender division of child care is often argued to be one of the most important causes for the gender differences on the labour market (see e.g., Albrecht et al., 1999; Gupta and Smith 2002, 2008; Bertrand et al., 2010; Azmat and Ferrer 2012). One intent with the parental leave system is to provide mothers and fathers with the opportunity to take care of a child without the risk of losing the job. However, mothers take the larger share of parental leave. Much political effort has been exerted in order to promote fathers to increase their share of parental leave.[4] The underlying idea and expectation is that fathers' involvement in child care is not only beneficial for the child, it would also diminish the gender differences on the labour market.[5]

The Nordic countries have for a long time period provided a generous parental leave system in which benefits are conditioned on employment before leave and the worker is guaranteed to keep the job while on leave. This has likely contributed to the high female labour force participation in these countries (see e.g., Waldfogel 1998; Jaumotte 2004; Baker and Milligan 2008; and Han et al., 2009). On the other hand, we know that shortening the period of entitled job protected paid parental leave speeds up the return to work after giving birth among those who in any case would participate in the labour force (Lalive and Zweimüller 2009; Lalive et al., 2012). Gupta and Smith (2002) have pointed out that a "too" generous parental leave system might discourage women to increase their labour supply at the intensive margin. Furthermore, Albrecht et al. (2003) claim that the Swedish generous parental leave system has contributed to the persistent gender inequalities on the Swedish labour market. Their reasoning is that as long as women continue to take the larger share of the parental leave, there is a risk of statistical discrimination against women, which in turn implies lower earnings and a glass ceiling for women.

A more direct way to encourage a more gender equal share of the parental leave through family policy is to introduce father quotas in the parental leave system. Several countries (Denmark, Germany, Iceland, Norway and Sweden) nowadays have one or a

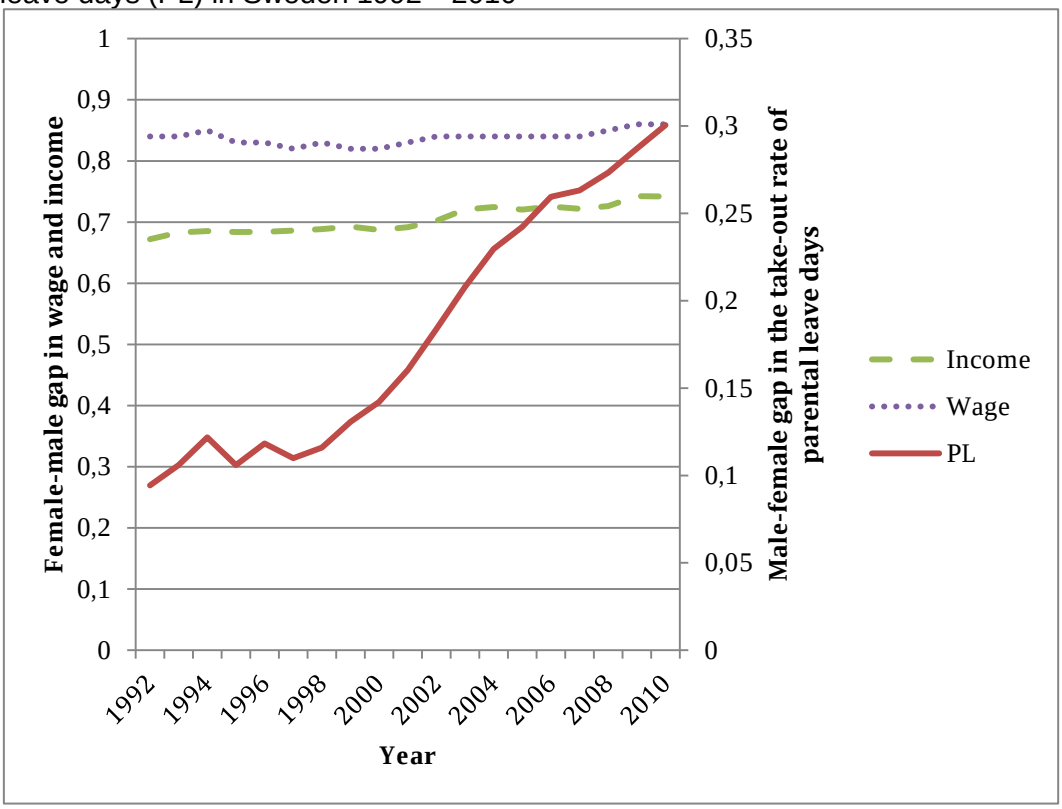
[4] For example, In March 2010 the European Parliament adopted a directive stipulating the minimum requirements for parental leave, including a non-transferrable paternity quota of four weeks. European Union: Council Directive 2010/18/EU.

[5] For recent studies on the effect of more father involvement in the child care on child outcome, see for example Liu and Nordström Skans (2010), Cools et al., (2011) and Felfe and Lalive (2012).

few months earmarked to each parent. These policies have promoted a more gender equal leave-taking rate (Ekberg et al., 2012; Dufvander and Johansson 2010). Some studies also show that women's earnings are positively affected by such policies (see e.g., Lindström 2009; Rege and Solli 2010). Parental leave implies career interruptions in periods connected with childbirth and may affect future career choices and options which may have consequences for individuals' wage trajectory and long-term labour supply. Most research in this field relies on earnings as a labour outcome measure. Since earnings capture both labour supply and wages it is still an unresolved question to what extent such gender promoting policies affect actual labour supply. To understand how gender differences on the labour market are formed it is also important to analyse how fathers' labour supply is affected by such policies. Up to this date we know little about how parental leave policies affect father's labour supply.

The underlying research question in this paper is to what extent gender equality promoting policies have had any real effect on the gender differences in labour supply. Figure 1 shows that fathers' share of leave-taking in Sweden has increased continuously over a 20 years period. Remarkably, the gender gaps in wages and labour supply have been fairly constant during the same period. It seems like a puzzle why gender differences on the labour market have not declined together with fathers' relative increase in paid parental leave take-out. One question is how labour supply is affected by more entitled paid days and when leave days become ear-marked to one parent in a leave system which provides generous job-protection and a great flexibility when to use the parental leave.

Figure 1: Gender gap in income and wage and in the take-out rate of paid parental leave days (PL) in Sweden 1992—2010



Note: 1) Income- and wage gap is reported as female-male gaps, while parental leave days (PL) are reported as male-female gap.
Sources: Wage gaps: National Mediation Office. Income gap: statistics Sweden. PL days: Social insurance board

In the Swedish parental leave system both parents are entitled to job-protected unpaid leave during the first 18 months after childbirth. Until the child turns 8 years old parents can use their entitled paid days and they have the right to work part-time. This implies that Swedish parents can spread out their paid and unpaid leave over a significant period of time. It also implies that job-protected actual leave can consist of a combination of paid and unpaid days.[6] We know that Swedish parents, in particular mothers, indeed make use of the unpaid job-protected leave and take out more parental leave than they get payment for (Berglund, 2004).

In this paper, we study the labour supply responses to three reforms within the Swedish parental leave system, recognizing that parental leave-taking might not fully reflect actual time off from work. The first reform increased entitlement to paid parental

[6] In most countries the total period of entitled job-protected leave period exceeds paid leave (Ray et al., 2009, OECD 2011).

leave by three months: from 12 to 15 months. The parents were free to decide how these additional days should be allocated between them. However, one of the aims with the prolonged entitlement was to increase fathers' involvement in the child care of the new-born.[7] In the second reform, one month of paid leave was earmarked to each parent, and could, hence, not be transferred to the other parent. Since mothers stood for the majority of parental leave take-out, this, in practice, implied that one month of paid leave was transferred from mothers to fathers (for this reason the reform has come to be called the "daddy-month" reform). Finally, in the third reform, one additional month of paid leave was earmarked to each parent at the same time as entitled paid leave increased from 15 to 16 months.

Given the construction of the Swedish parental leave system, we can imagine the following different scenarios regarding the effects on parental labour supply: 1) Parents increase their consecutive actual leave and reduce their labour supply. An extended interruption from the labour market may imply human capital depreciation and/or signal a weak career commitment to the employer (see e.g., Mincer and Polachek 1974). As long as women take the larger share of the additional days provided, this may deteriorate women's position on the labour market. If the daddy-month reforms have increased leave-taking among fathers and induced mothers to return to work earlier, these reforms have positively affected mothers' labour market outcomes. 2) Parents take more *paid* leave days for leave days that would otherwise have been taken as unpaid. This scenario implies that the increased entitlement to paid leave work as a pure income transfer to parents, without any real labour supply effects. 3) Parents spread out their additional paid days over the entire job-protected period of eight years. This type of behaviour probably does not affect gender differences in the labour market in any significant way since spreading out days on leave does not alter employers' cost or individuals' human capital formation in any comprehensive way.

In order to estimate the effects of these policy changes on parental labour supply, we use register data covering the total population of Swedish parents who gave birth to their first-born child at the time the reforms were launched. These data allow us to distinguish between parental leave take-up and actual time off from work. This is an

[7] The Swedish Government's proposition: 1988/89:69.

important issue when total protected leave is longer than paid leave and when leave can be spread out over a significant period of time. We study the effects on parents' labour supply up to eight years after childbirth of the first-born. In all three reforms, the entitlement to the new rules varied discontinuously with childbirth month. This enables us to potentially identify the effects of the reforms by exploiting variation in birth month of the children.

Our main results are that additional days are either spread out over a long time period or that labour supply effects are modest. The first reform, which increased entitlement to paid leave by 90 days, did affect parents' labour supply, but the entitled parent, in particular fathers, spread out the additional 90 days until the child turned eight years old. Parents' aggregated labour supply two years after childbirth only decreased by 1.5 months and the parents were affected to the same extent by the reform (about 3 weeks by each parent). This is interesting since the additional days provided by this reform were not earmarked to any particular parent and, at the time, mothers took out the large majority of all days. The last two reforms proved to be difficult to evaluate due to seasonal variation in parental leave-taking across comparison groups, but tentative evidence suggests that parents' labour supply remained unaffected even though parental leave-taking increased among fathers, as expected, and decreased among mothers. Taken together, our findings suggest that the gender division of labour supply was more or less unaffected by the three last reforms in the Swedish parental leave system.

By looking at how parents' response to changes in the parental leave system our paper relates to a long strand of literature on how mother's leave-taking and earnings are related to the design of family policies (see e.g., Ruhm 1998; Klerman and Leibowitz 1999; Baum 2003; Hashimoto et al., 2004; Baker and Milligan 2008; Ejrnaes and Kunze 2006; Schönberg and Ludsteck 2007; Lalive and Zweimüller 2009; Lalive et al., 2012). Two studies are very close to our study. Liu and Nordström Skans (2010) study how the parental leave affect cognitive skills of children using the same 1989 reform as used in this paper, but they also look at effects on mothers' earnings up to seven years after child birth and find no significant effects. Our paper complements this study by using an explicit measure of labour supply and also by estimating effects on fathers' labour supply. Our paper also complements a recent paper by Ekberg et al., (2012) and a paper by Eriksson (2005) which study fathers and mothers parental leave

take-up using the same 1995 and 2002 reforms as used in this paper.[8] We find similar results with respect to parental leave take-up. However, their evaluation of effects on labour supply is based on a sample which is subject to attrition over time. Since parental leave policies can have important effects on the extensive margin it is important to avoid attrition when estimating reform effects on labour supply.

Taken together, our contribution is that we evaluate both mothers' and fathers' labour supply responses to different types of parental leave reforms. Arguably, to understand how family policies affect gender differences on the labour market it is necessary to estimate the behaviour among both mothers and fathers. We also emphasize the importance of using an appropriate measure of labour supply, not at least against the background that the use of parental leave benefits does not fully reflect actual time off from work.

This paper is organised as follows. We start by presenting the Swedish institutional setting in general, and the reforms evaluated in this paper in particular (section 2). Thereafter we present our empirical strategy: identification, data sources and data management (section 3). In section 4 we present the results from our analyses, and in section 5 we conclude the paper with a short discussion of our findings.

2 The Swedish setting and the three reforms

The Swedish parental leave system was introduced in 1974, when maternity leave was replaced by parental leave such that also fathers became eligible for parental leave. Parents were then entitled to six months of paid leave at a compensation rate of 90 percent of labour earnings up to an inflation-adjusted cap. The compensation rate was lowered to 80 percent in 1995, and remains at that level today. Thus, benefits are conditioned on employment and the requirement is that parents must have been employed for 240 days before the child is born. For individuals that do not meet the work requirements, all days are compensated at a lower fixed rate of SEK 180 per day. This leave is job protected and the system offers a great portion of flexibility. During the child's first 18 months both parents can stay at home full-time with job protection to take care of the child. Thereafter, parents are allowed to reduce their working hours up

[8] Ekberg et al. (2012) studies the 1995 reform and Eriksson (2005) studies the 2002reform.

to 25 percent until the child reaches eight years of age (SFS 1995:584).[9] The entitled paid days could also be saved and used until the child turns eight years old. Important to note is also that the employer cannot deny an employee to use the paid parental leave days whenever he or she wants to. Thus, parents may have incentives to save paid days for future use to increase their flexibility to take a day off for childcare reasons.

Since the introduction, the parental leave system has been subject to several extensions. In 1975, parents were entitled to 7 months of paid leave. In 1978, paid leave was further extended to nine months, but were one month of paid leave was compensated at a flat rate of 60 SEK per day (not to be confused with the fixed rate paid to parents without previous earnings). From 1980 to 1989, parents were entitled to 12 remunerated months of which three months were compensated at the flat rate. In 1989, total months increased to 15 and since 2002 parents are entitled to 16 months of paid leave (with three months compensated at the flat rate in both time periods).

In this paper we explore the effects of the three last policy changes. In all three cases, the entitlement to the reform depends on the birth month of the child.

The first reform explored -- the 1989 reform -- implied an extension of paid parental leave from 12 to 15 months. The aim was to increase the possibilities to take care of the new-born child. This reform was implemented on the 1st of July 1989, but retroactively covered parents to children born in October 1988 onwards. It is thus unlikely that parents anticipated the reform and changed their timing of birth in order to benefit from the new rules. Transition rules following the implementation implied that parents to children born in August and September 1988 received one and two extra months of paid leave, respectively, and that parents to children born in October onwards received three months extra. No other relevant reforms took place during the time period.

The labour market situation during the late 1980s was characterized by low unemployment rates: ranging between 1.5 and 3 percent. Female employment rate in Sweden has been high since the late 1970s.[10] Thus, taken together, at the time of the 1989 reform almost all men and women in Sweden were employed.

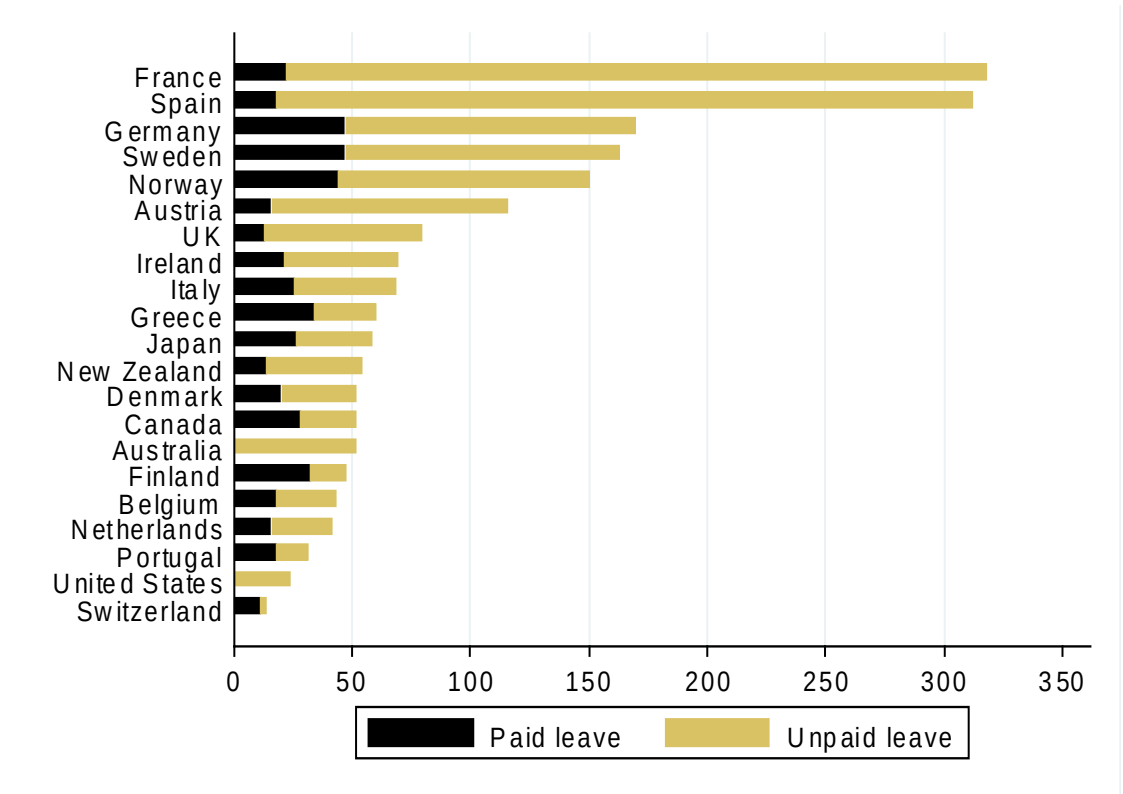
[9] The right to reduce working hours was introduced in 1989, but retroactively covered all parents to children born in 1986 onwards.

[10] During the late 1980s the female employment rate was around 80 percent which is only a few percentage points below the corresponding rate among men.

The next policy change explored -- the 1995 reform -- implied that one paid month became earmarked to each parent. The aim was to promote a more equal sharing of childcare between mothers and fathers. Parents to children born before January 1995 were given an equal share of the paid parental leave, but were free to transfer the days between each others. In practice, this meant that fathers transferred most of their months to mothers. However, after the 1st of January 1995 one month of paid leave was lost if the father did not take any paid leave at all. In order to further promote fathers' share of the parental leave, the 2002 reform implied that one additional month became earmarked to each parent. At the same time the number of paid months increased from 15 to 16 months. This is the third reform we explore in this paper.

In comparison to other countries, Sweden has a relatively generous system with respect to job-protected and unpaid parental leave. However, Ray et al. (2009) show that in most countries the unpaid job-protected leave is more than twice as long as the job-protected paid leave. Figure 2 sums up these two components of the parental leave system for 21 OECD countries.

Figure 2: Paid and unpaid job-protected full-time equivalent entitled parental leave in weeks for two-parent families



Source: Rey et al. (2009).

3 Empirical strategy and data

In this section we present the empirical strategy, the data and some descriptive statistics.

3.1 Empirical strategy

When evaluating the 1989 reform we rely on variation in entitlement within the year of 1988. To control for potential seasonal effects, we let parents to children born in 1987 and 1989 serve as additional control groups. This strategy was first used by Liu and Nordström Skans (2010) when estimating the effect of the same reform on child outcomes. Specifically, we estimate the following regression model:

$$Y_{icm} = \alpha + \delta E_i + \mu_1 D_{i1988} + \mu_2 D_{i1989} + \lambda_m + \beta \boldsymbol{X}_{i,pre} + \varepsilon_{icm} \qquad (1)$$

where Y_{icm} is the outcome measure (labour supply) for parent i who had their first child in year c (1987, 1988 or 1989), and month m (m = 1,....,12). D_{i1988} is a birth cohort dummy that equals one if the parent had their child in 1988 (zero otherwise). D_{i1989} is a birth cohort dummy that equals one if the parent had their child in 1989 and zero otherwise. The 1987 cohort is the reference group. λ_m are birth month dummies (m=1, ..., 12) and capture seasonal effects and $\boldsymbol{X}_{i,pre}$ is a vector of pre-child parental characteristics (birth year, pre-birth monthly wages and pre-birth labour income). The variable of interest, E_i, takes the value 1 if the child is born in August 1988, 2 if the child is born in September 1988 and 3 if the child is born in October - December 1988 (0, otherwise). Thus, δ measures the linear effect of being entitled to one additional month of paid PL on parents' outcomes. Thus, we compare the difference in outcomes for parents who had their first child born between August and December 1988, with the parents who had their first child between January and July the same year. To control for potential seasonal effects, the corresponding difference due to birth-month of the child in 1987 and 1989 is included in the estimation.[11]

In order for δ to identify the causal effect of increased entitlement to paid parental leave, the monthly effects must be the same across years. To examine this, we estimate a similar model, but in which each monthly dummy is interacted with the 1988 childbirth cohort-dummy:

[11] We have also estimated the same model using data only on 1987 and 1988, which does not alter the results in any significant way.

$$Y_{icm} = \alpha + \delta_{Jan}D_{iJan,1988} + \ldots + \delta_{Dec}D_{iDec1988} + \mu_1 D_{i1988} + \mu_2 D_{i1989} + \lambda_m + \varepsilon_{icm,} \qquad (2)$$

where July is used as the reference month. If our identifying strategy is correct, we would expect to see no differences in the monthly effects between the 1988 and 1989 cohorts for the months January to July. However, differences in the monthly effects between the cohorts from August onwards would indicate a reform effect.

Since the entitlement to paid parental leave was introduced retroactively in the 1989-reform, the parents could hardly have adjusted their fertility decisions before the reform. However, after the reform, fertility decisions may have been affected by the new more generous rules. We have estimated reform effects on the annual probability of having an additional child as well as on completed fertility using the specification (1). The results from this analysis show that there are no effects on fertility (the results are presented in Table A 3 in Appendix).

With respect to the father-quota reforms we examine the effects on both labour supply and parental leave. For the 1995 reform we compare differences in outcomes of parents who got their first child in December 1994 with the outcomes of parents who got their first child in January 1995, by using the same data sources as in the preceding analyses. To account for potential seasonal effects between December and January cohorts, we also use data on children born in December and January 1995 and 1996, respectively. We have the following difference-in-differences model in mind:

$$Y_i = \alpha + \beta D^{1995/94} + \theta D^{Jan} + \delta D^{1995/94} \times D^{Jan} + \varepsilon_i \qquad (3)$$

where $D^{1995/94}$ is a dummy variable indicating if a parent had his/her first child in December/January 1994/1995 instead of December/January 1995/1996, and D^{Jan} is a dummy variable indicating whether the child was born in January. The variable of interest is the interaction between $D^{1995/94}$ and D^{Jan}, namely δ, which measures the difference in labour supply (or parental leave take-up) between mothers (or fathers) who had their first child in January 1995 and mothers (or fathers) who had their first child in December 1994, in comparison to the corresponding difference between mothers (or fathers) who had their first child in January 1996 and December 1995, respectively.

The 2002 reform was implemented in a similar way and we could therefore apply the same empirical strategy, using data on the corresponding appropriate parent groups.

That is, we compare the difference in outcomes between parents to children born in January 2002 and parents to children born in December 2001, with the corresponding difference between parents to children born in January 2003 and December 2002.

As in the 1989-reform, the identifying assumption is that the monthly effects are the same across years. In the section presenting the results, we address this issue by providing descriptive statistics of the difference in outcomes between parents to children born before and after several year-shifts.

3.2 Data

Our data is mainly based on Swedish population wide registers. We use the multigenerational register to link all children to their biological parents. This register also contains information on child birth month and birth year of the child. To this data we have added information about parental labour market outcomes such as annual labour earnings, educational attainment, contracted hours, parental leave take-out rates and monthly wage rates (monthly full-time equivalent labour earnings) as well as a set of demographic variables such as age and birth region. All this information is from administrative registers that cover the whole Swedish population, except for the information on wages. Wage rates are available for the total population of public sector workers, but for the private sector, information on monthly wage rates is based on yearly random stratified samples of workers in firms with less than 500 employees (workers in firms with at least 500 employees are all included in the sample). This means that around 50 percent of the workers in the private sector are covered.

We are able to follow individuals from 1985 to 2006. Data on parental leave is, however, only available from 1988 onwards. The sample used in the analyses consist of parents who were eligible for paid parental leave and for whom we have information on individual wages the year before they had their first child.[12] All analyses are based on first-born children in order to avoid bias from parental leave days used to take care of older siblings.[13]

[12] Keep in mind that the employment rate in Sweden at the time was extremely high. This fact in combination with the employment based parental leaves system implies that the analysis is based on almost all new Swedish parents at the time.

[13] In the registers we have information about how many days with parental benefit each individual has used, but we cannot link these days to a particular child. Thus, we cannot separate days used for a younger sibling.

The outcome variable of interest is monthly labour supply, defined as annual labour income[14] divided by the monthly wage rate, which are always measured the year before the child's birth-year. As such, a mother with an annual income of SEK 200,000 and a monthly wage rate of SEK 20,000, we say has been working for 10 months. The reason why we always use the wage rate the year prior to child birth instead of updated wage rates every year, is that wages are not observed for everyone in all years (and by using yearly updated wages we would run into sample selection problems).

Roughly speaking, our empirical strategy compares the difference in labour supply between parents to children born in adjacent months but where one group of parents was exposed to a particular parental leave reform. To control for seasonal effects, we construct two additional comparison groups of parents to children born in the corresponding adjacent months, but one year later and one year earlier. This empirical strategy in combination with our measure of labour supply implies that we assume that the difference in wage trajectories between treated and compared individuals around the reform, is the same as the corresponding difference in the comparison period. This is a reasonable assumption in the short-run since wages do not instantaneously adjust to potential changes in labour supply.

A final note regarding data: registered annual earnings are measured on calendar year basis, which means that monthly labour supply will also be measured per calendar year. Parents who gave birth early in the year will therefore have a lower labour supply than parents who gave birth later in the same year. However, this is not a problem by virtue of our difference-in difference strategy.

Our main interest is potential effects on labour supply, but we will also investigate the effects on monthly parental leave take-out rates for the 1995 and 2002 reforms. Data on parental leave take-out rates from the time of the 1989 reform does not allow us to observe the actual number of paid days used.[15] We measure parental leave take-out rates in the same manner as we measure labour supply.

[14] This annual labour income stems from the labour income the employer report to the tax authorities. Thus, any additional benefits disbursed by the employer in case of parental leave, for instance, are not covered. Thus, this income is the wage multiplied with the labour supply.

[15] Data on parental-leave take-out rates between 1988 and 1993 are based on start- and end-dates without information on the actual number of remunerated days within each spell. This feature of the data in combination with the flexible rules of parental leave take-out in the Swedish system (benefits can be received as a quarter or half of full-time), imply that a registered spell can be a combination of work and parental leave.

3.3 Descriptive statistics

Descriptive statistics for parents giving birth around the three reforms are reported in Table A 1-A3 in the Appendix. In Table A 1 the parents studied when evaluating the 1989 reform are presented in terms of mean pre-birth characteristics. This table shows that fathers are about two years older when having their first born child; fathers have about 10 percent higher pre-birth wages and about 30 percent higher labour incomes than mothers.

Table A 2 shows differences in parental characteristics between parents to children born in the autumn and the spring in 1987, 1988 and 1989, respectively. The fourth column reports the difference between the autumn-spring difference within 1988 and the autumn-spring difference within 1987. The fifth column reports the difference between the 1988 and 1989 autumn-spring differences in these characteristics. According to these estimates, the different groups appear to be comparable in terms of pre-birth observable characteristics.

Descriptive statistics for the 1995 and 2002 reforms are reported in the upper and lower panels of Table A 3, respectively. Parents who gave birth to their first-born child in January 1995 (2002) are compared to parents who gave birth to their first-born child in December 1994 (2001). These differences are also compared to differences in other periods, when there was no reform, i.e. to 1995/1996 and 2000/01, respectively. In other words, we estimate a difference-in-differences model on pre-treatment characteristics. As can be seen from Table A 3, there are no significant "seasonal" differences across the year changes 1994/1995 and 1995/1996 in parental characteristics. However, for mothers, there appear to be significant seasonal differences across 2001/2002 and 2002/2003, which may complicate an evaluation of the 2002 reform. We will get back to this in closer detail in subsequent sections.

4 Results

4.1 Effects of a general extension of paid leave

We start by looking at the labour supply responses to the 1989 reform. Before presenting the results at different child ages which provides the complete picture of the effect (until the child turns eight years old), we present graphical evidence that highlight our identifying assumption. Figure 3 shows mothers' monthly labour supply accumu-

lated up to the year when the child turns two years old, by child birth months and separately for mothers to the 1987, 1988 and 1989 child cohorts, respectively. Figure 4 shows the estimated monthly difference in labour supply between 1988 and the two adjacent years: 1987 and 1989. The plotted estimates are based on equation (2) and July is used as the reference month. The corresponding results for fathers are shown in Figure 5 and Figure 6.

According to Figure 3, mothers' monthly labour supply is lower the earlier in a year the child is born. This is because mothers who gave birth to a child early in the year stopped working much earlier than mothers who gave birth later during the same year, and they have not caught up until the year when the child turns two years old. Importantly, the development of monthly labour supply is rather similar for the 1988 and 1987 cohorts before the reform was in force (august onwards). This supports the use of the difference-in-differences identification strategy. From August onwards, labour supply seems to have decreased for the 1988 cohort relative to the 1987 cohort. The estimated differences presented in the right panel, Figure 4, indicate that from October, when the reform was fully implemented, labour supply has decreased significantly: about three quarter of a month. For fathers, Figure 5 and Figure 6 show about the same pattern, but the estimates seem to be less precise.

Figure 3: Accumulated months worked up to the child's 2nd year, separately for mothers to children born in different cohorts

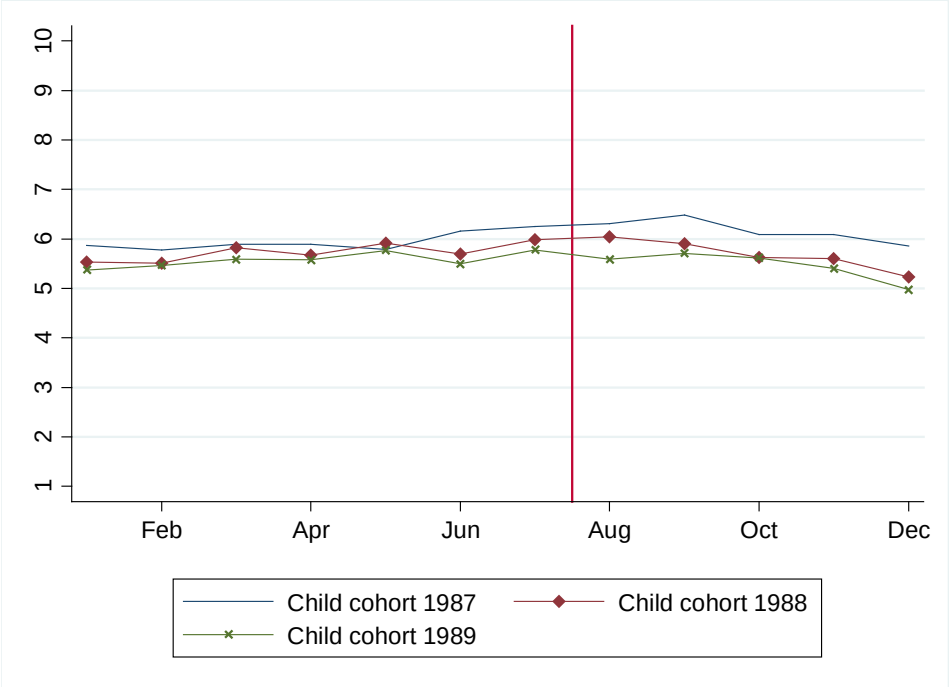
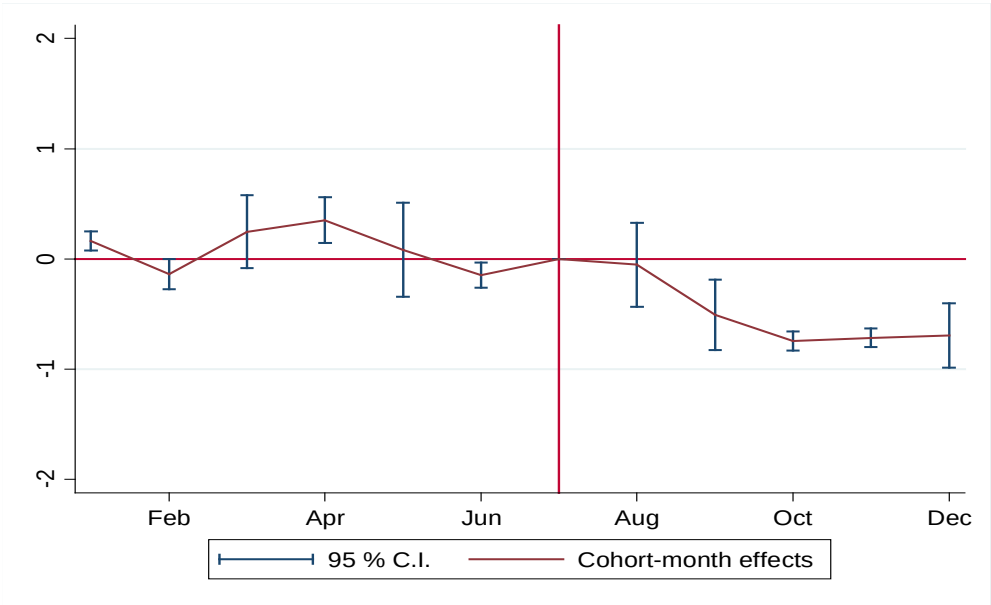


Figure 4: Estimated monthly differences in labour supply between mothers who had their first child in 1988 in comparison to mothers who had their first child in 1989



Note: the graph shows the coefficients of the interaction terms of each birth month and the 1988 cohort indicator (for mothers) estimated as described by equation (2), and the corresponding 95 percent confidence intervals. Data on the 1988 and 1989 cohorts is used.

Figure 5: Accumulated months worked up to the child's 2nd year, separately for fathers to children born in different cohorts

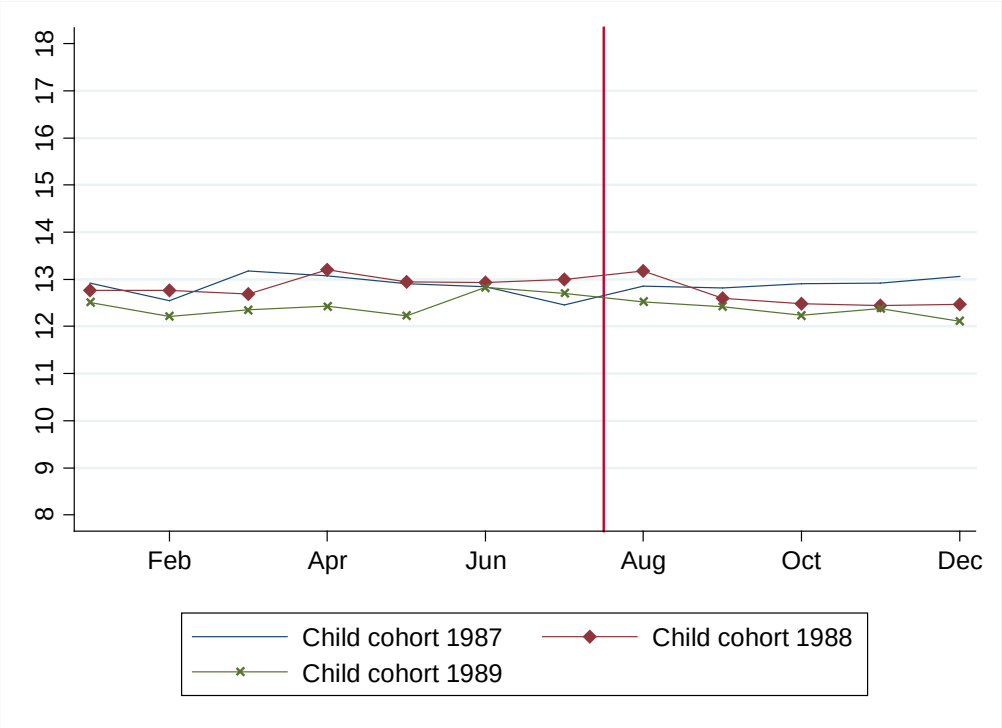
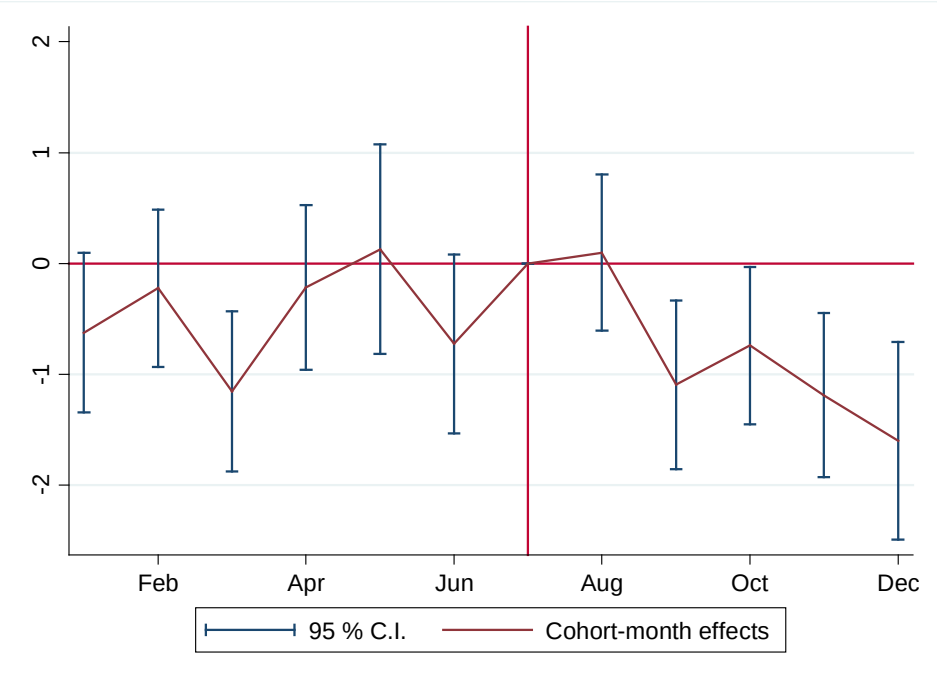


Figure 6: Estimated monthly differences in labour supply between fathers who had their first child in 1988 in comparison to fathers who had their first child in 1989



Note: the graph shows the coefficients on the interaction terms of each birth month and the 1988 cohort indicator (for fathers) estimated as described by equation (2), and the corresponding 95 percent confidence intervals. Data on the 1988 and 1989 cohorts is used.

Table 1 shows the estimated 1989 reform-effects on labour supply based on equation (1). The effects are evaluated when the child is at different ages, separately. Each estimate corresponds to the cumulative reform-effect on parents' monthly labour supply from the birth-year until the child turns the specific age. The upper panel reports results for mothers and the lower panel reports the results for fathers. The year when the child turns two years old, one additional month of entitled paid leave decreased mothers' labour supply by approximately one-fourth of a month (0.271 from column 3). Translated into the total reform effect this magnitude corresponds to an increase of about 25 days (0.271×30×3). As shown by Table 1, mothers' labour supply is affected the first two years after the birth year and the last three years the paid days could be used, that is when the child is between six and eight years old. The full impact of the reform of the three additional entitled months – evaluated at the child age of eight – implied a reduced labour supply with approximately one month (3×0.354 from Table 1).

Also fathers' labour supply decreased due to the reform. The year when the child became two years old, one additional month of entitlement to paid leave decreased fathers' labour supply by 0.259 months on average. The year when the child became eight years old, fathers' labour supply had decreased by almost 1.5 months (3×0.487). Thus, fathers reacted to the reform even more than mothers. Adding fathers' and mothers' labour supply responses together implies that parental labour supply decreased by almost three months, which is a full response to the reform. However, the labour supply response took place during a time period as long as eight years. The individual *consecutive* actual leave in connection to childbirth (i.e., two years after childbirth) only increased by less than a month. One third of all additional paid days provided was used for occasional days off from work (due to child care) over a relatively long time period.

Table 1: Estimated effects of the 1989 reform on months worked, accumulated year by year, up to the child's 8th year

Child age	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mothers									
Months worked	-0.114***	-0.226***	-0.271***	-0.242***	-0.209***	-0.233**	-0.346***	-0.362***	-0.354***
(N=41,893)	(0.016)	(0.016)	(0.029)	(0.047)	(0.066)	(0.090)	(0.098)	(0.114)	(0.123)
Months worked in year prior to birth	10.312								
Fathers									
Months worked	-0.052**	-0.141***	-0.259***	-0.325***	-0.407***	-0.447***	-0.535***	-0.513**	-0.487*
(N=24,465)	(0.020)	(0.049)	(0.074)	(0.098)	(0.131)	(0.157)	(0.181)	(0.224)	(0.269)
Months worked in year prior to birth	11.882								

Note: Standard errors in parentheses. Included covariates are parents' birth year, pre-birth monthly wage, and pre-birth income. The reason for the fewer observations on fathers is that we condition on information on wages in the regressions, and this information is available for the entire female dominated public sector, but only for 50% of the male dominated private sector.

4.2 Effects of earmarking paid days to each parent

In this section we analyse the impacts of the two reforms that had the explicit aim to increase fathers' share of the parental leave take-out.

Figure 7 and Figure 8 illustrate the monthly parental leave take-out for fathers and mothers, respectively, for parents who had their first child born in December and January in 1994 through 2005. Parental leave take-up is here measured from 1 year up to eight years after childbirth. By comparing the parental leave take-up of parents to children born in December 1994 with the parental leave take-up of parents to children born in January 1995, one could in principle get an estimate of the causal effect of the 1995 reform on parental leave and labour supply. The same strategy could be applied to evaluate the 2002 reform, using appropriate birth cohorts. This strategy is illustrated in equation (3) in section 3. However, a challenge in this case is that there is a lot of unexplained variation in the January-December differences across years. Thus, we cannot identify an appropriate comparison group and estimate the causal reform-effects in any concise way. Instead, our following analyses are based on the pattern shown in Figures 5--8, and they should be considered as very crude 'estimates' of the reform effects, and should be interpreted with caution.

According to Figure 7, fathers seem to have increased their parental leave take-up as a response to both the 1995- and the 2002 reform. The increase took place from the second year after childbirth. This conclusion is based on the fact that both the 1995/1994 and 2002/2001 January-December comparisons show discrete upward jumps in fathers parental leave take-up from the second up to eight years after childbirth, but all other January-December differences show a downward jump in fathers' leave take-up. One exception is the 1997/1996 January-December difference, where the parental leave take-up difference instead is positive. Figure 8 shows the corresponding graphs for mothers, where we can see a downward jump in parental leave take-up between December 1994 to January 1995, and an upward jump between December 2001 and January 2002. The latter is likely due to the fact that, in the 2002 reform, an additional month of paid leave was reserved to each parent at the same time as total paid leave was extended by one month. If mothers used the majority of the extra paid month, we would expect to see an upward jump in mothers' paid parental leave take-up.

Moreover, the decrease in parental leave take-up that took place in most January-December comparisons are of different size depending on how many years after child-

birth that is considered, and depending on which January-December comparison that is considered.

Turning to labour-supply, Figure 9 and Figure 10 show monthly labour supply for fathers and mothers, respectively, who had their first child in January or December. In contrast to parental leave take-out, it is hard to observe any labour supply effects at any year. In Table A 5 and Table A 6 we present difference-in difference estimates of the reform-effects based on the empirical strategy presented in Section 3.1. The estimated positive effects on the take-out rate of parental benefits among fathers are in line with earlier results presented by Ekberg et. al. (2012), Eriksson (2005) and Duvander and Johansson (2010). However, important to note is that we cannot – with the same empirical strategy – find corresponding effects on labour supply among men.[16]

Taken together, these figures provide tentative evidence of parental leave increasing for fathers, and decreasing for mothers, but that labour supply did not change as a result of the policy changes. Of course these results should be interpreted with some caution. However, if there were in fact large effects on labour supply, we should have been able to observe this in the graphs. One reasonable interpretation of these findings is that mothers did not return to work earlier to the extent that they decreased their take-up of parental leave benefits, but instead made use of unpaid job protected leave.

[16] Labour supply cannot be directly measured from Swedish register data, since we do not have information about wages in the registers covering the whole population (see section 3.2). In contrast to earlier Swedish studies on these reforms, we use information about wages the year before the treatment-year (the year the entitlement was changed). This generates a measure of labour supply free from attrition bias. A draw back could be that the pre-birth wage is less informative for every additional year since it is measured. In this context it is important to note that we for the 1989-reform find the full effect of the reform eight years after the treatment-year by using this labour supply measure. This result indicates that our measure of labour supply is appropriate at least within a follow-up period of eight years.

Figure 7: Fathers months of parental leave by child birth month

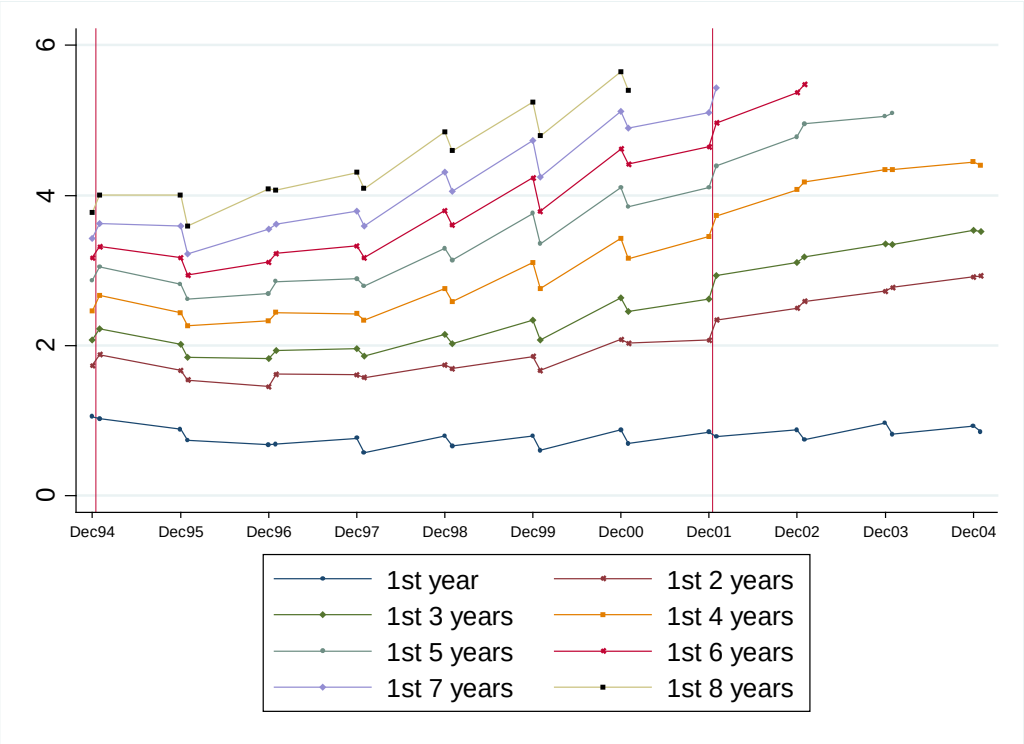


Figure 8: Mothers months of parental leave by child birth month

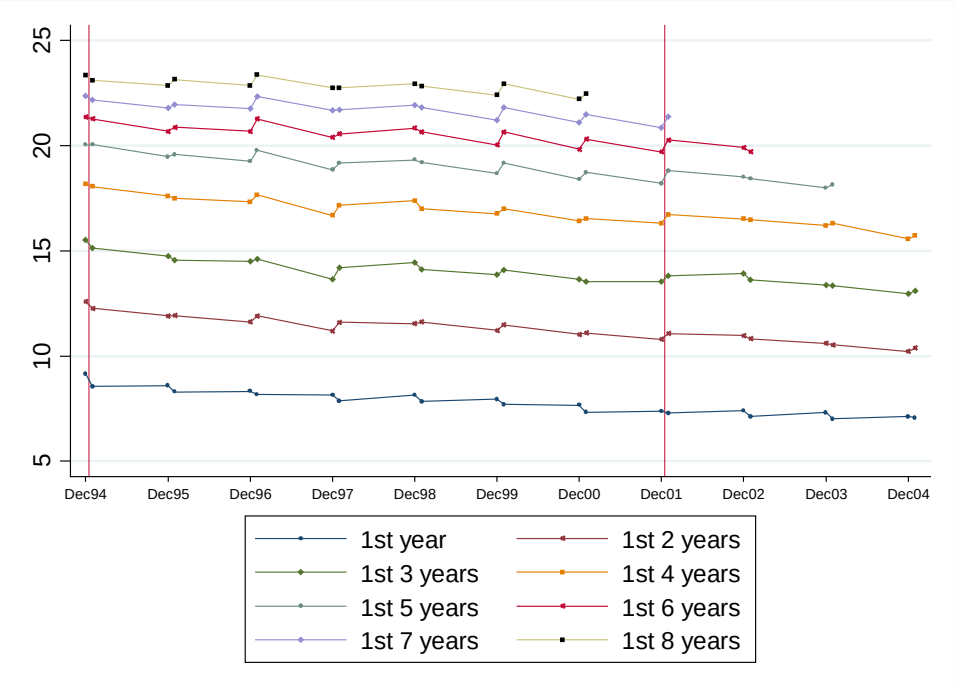


Figure 9: Fathers' months worked by child birth month

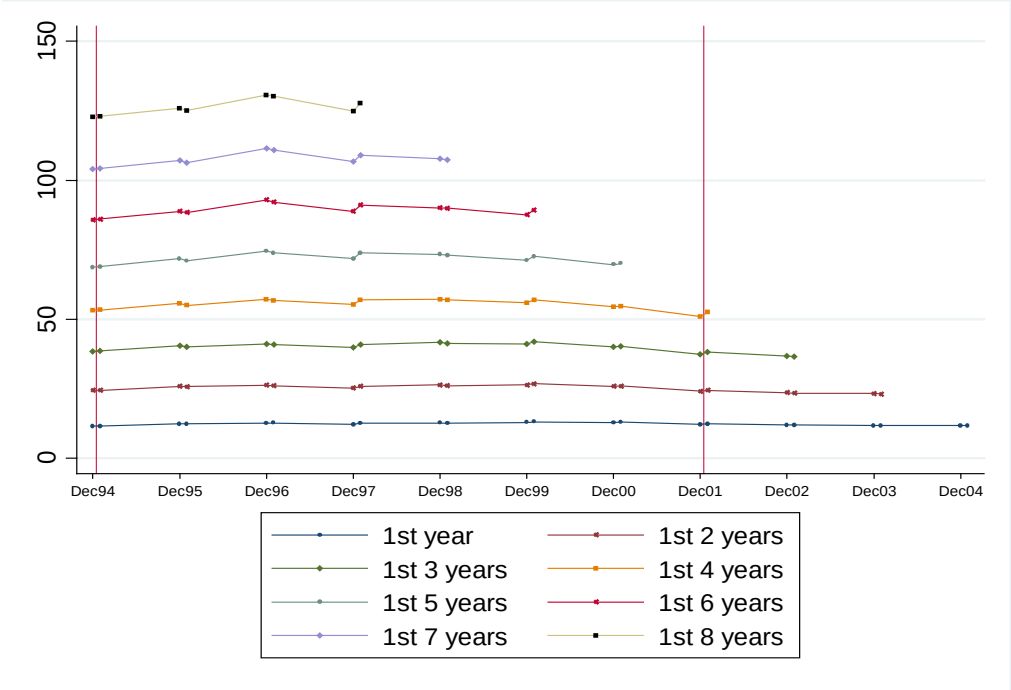
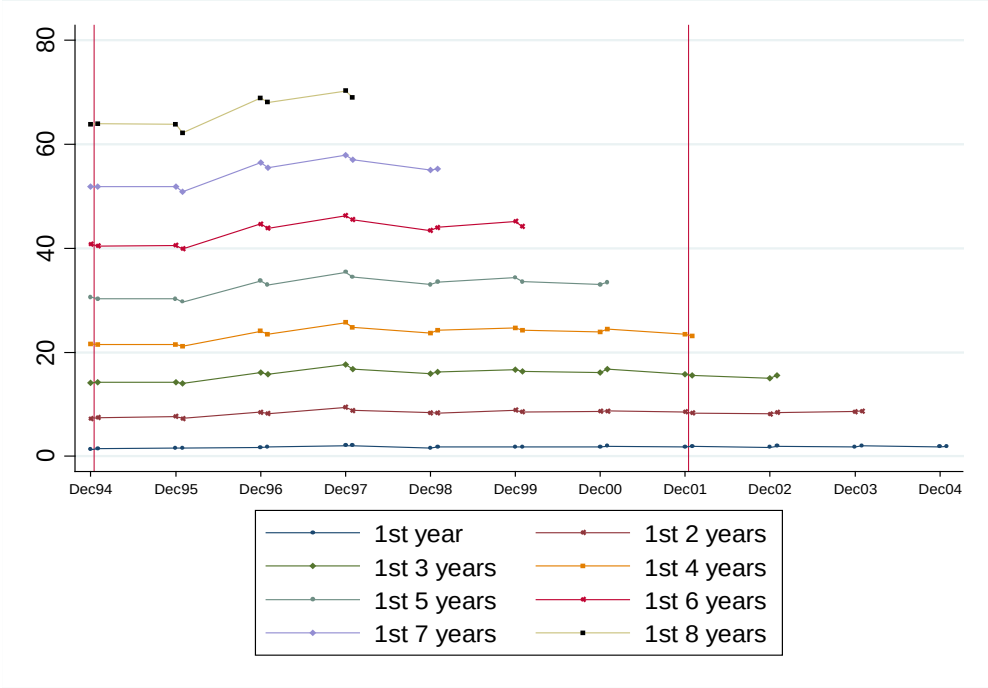


Figure 10: Mothers' months worked, by child birth month



4.3 Heterogeneous effects depending on pre-birth income

The conclusion so far is that parents use much of the additional days to take occasional days off or get compensation for days they already have chosen to be on leave. The consecutive leave taken by each parent is not much affected. However, this conclusion

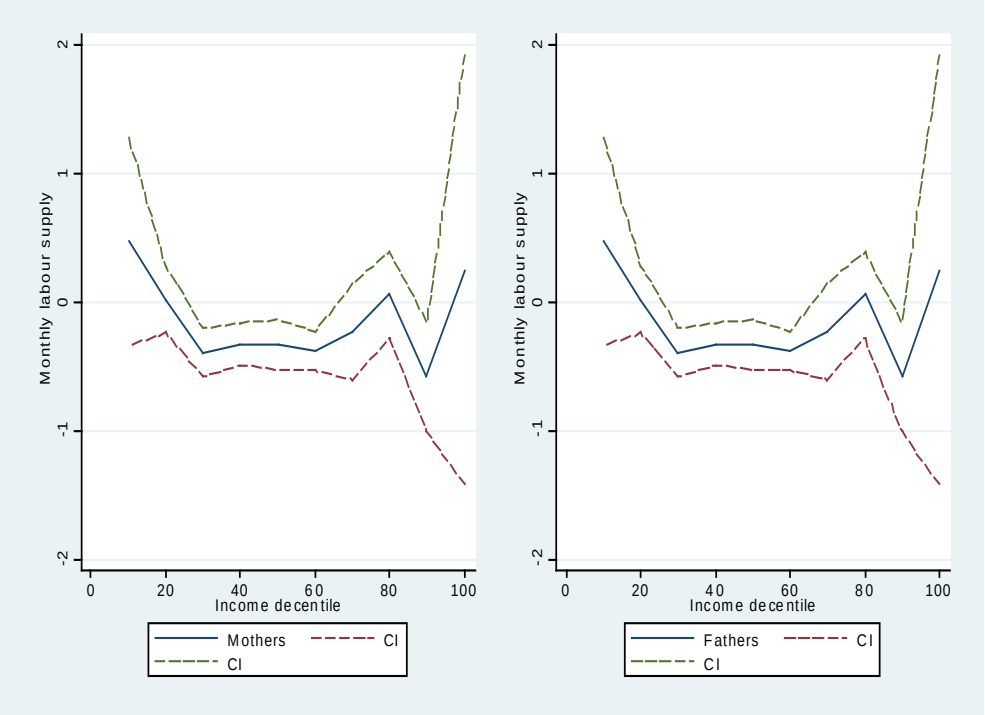
implies that parents have optimized their consecutive leave more or less independently of the marginal provision of paid parental leave days within the job-protected leave. This may not hold for all parents. For example, parents with low-income may wish to stay at home for a longer period than they could afford in absence of the reform, and they may therefore use all the additional days to prolong their consecutive leave. If this is the case, we might have heterogeneous effect both in the short- and the long run.

In order to investigate the relevance of this reasoning, we have estimated the short-run effects of the 1989- reform separately depending on the pre-birth income of the mother and the father, respectively. The heterogeneous, accumulated, reform-effects until the child turns two years old are presented in Figure 11. The overall message of this analysis is that the effect is rather constant across income-groups. However, in the end and the beginning of the income distribution, the effect seems to be less negative or even positive, but the estimates for these extreme groups are not statistically significant. This patterns hold for both mothers and fathers.

These results suggest that the large majority of parents in Sweden are not financially constrained when choosing the length of their consecutive parental leave. However, at the ends of the income distribution, the effect seems to be heterogeneous. Some low-income parents perhaps wished to stay at home for a longer consecutive period when the child was a baby before the reform, and therefore this group of parents perhaps use the extra days to prolong this period. Some high-income parents perhaps are less prone to save paid days for the future. An employer could never deny a parent to use their paid days, but this may be less important if high-income parents also have more flexible jobs that allow for occasional days off without the use of paid days.[17]

[17] It could also be the case that it is easier for high-income person to take one longer consecutive leave rather than occasional days off during a longer period of time.

Figure 11: Effects of the 1989 reform on accumulated months worked up to the child's 2nd year, for different income deciles of mothers and fathers



5 Concluding remarks

We have estimated labour supply effects of the three most recent major reforms in the Swedish parental leave system. The first reform increased entitlement to paid leave by three months. The other two reforms implied that one month in turn became earmarked to each parent (the last reform also increased total entitled days by one month). Our results show that the first reform affected both fathers' and mothers' labour supply almost the same extent and that they spread out the additional 90 days until the child turned eight years old – actual leave two years after childbirth was only increased by three weeks per parent. As such, this reform improved the gender-unbalanced take-up of actual leave. Since fathers' share of actual leave started from a very low level the relative increase in fathers' leave is very large. The last two reforms affected the take-up rate of paid leave, but we do not find any evidence of corresponding effects on either fathers' or fathers' labour supply.

Results should be interpreted within the context of the Swedish flexible parental leave system where parents can use paid leave until the child turns eight years old and where actual leave-taking, especially for mothers, is longer than paid leave. Within this

context it is possible that more entitled paid days are used for days that would otherwise have been taken without compensation, and that the number of occasional days off increases. Thus, when one month of paid leave become earmarked to one parent but where fathers' increase paid leave due to the reform is only about half a month, it is not surprising that we don't observe any significant labour supply effects.

It is remarkable that fathers' labour supply was only affected by the first reform and not the reforms with restrictions how leave should be allocated between the parents. It is possible that the willingness among parents to change from traditional gender roles to a more equal gender division may differ depending on the starting point. Fathers' take-out rate of paid parental leave days was very low at the time of the first reform but has increased continuously over time (see Figure 1).

We cannot conclude to what extent the reforms have affected gender equality on labour market in general. Since the additional days on leave due to the first reform were spread out over a significant period of time, we find it unlikely that parental human capital should have been affected. However, the first reform may have improved gender equality on the labour market if the additional days on leave to a higher degree signal less career commitment among men compared to women. We know that men who are on parental leave are more penalized in terms of labour market outcomes than comparable women who take the same amount of parental leave (Albrecht et al., 1999). The raised explanation is that Swedish employers expect women to be on leave for a long period when entering parenthood, while this is not the case for men. Thus, the signal value of parental leave differs between men and women, implying that the effects of the first reform may have indirectly affected the gender equality on the labour market.

The father quota reforms seemingly did not affect actual time off from work due to child care reasons. All reforms, however, and in particular the daddy-month reforms, were preceded and followed by a public debate about the gender division of parental leave. This debate might itself have contributed to the general trend of an increased involvement among fathers in child care. However, if these indirect effects were large we would arguably have observed greater changes in gender differences on the labour market, for example a diminishing gender wage gap. If part of the gender wage gap is due to statistical discrimination against women because of their higher expected leave-

taking, we would expect discrimination to decrease when fathers' increased their leave-taking due to the first reform. In fact, the gender wage gap has remained fairly constant the last three decades.

What this paper shows is that parental leave policies with the aim to promote gender equality do not necessarily lead to large and direct effects on gender equality. As pointed out by Albrecht et al., (2003), the Swedish parental leave system encourages female labour supply, but only on the extensive margin. The generous job protected leave within the parental leave allow for part-time work and great flexibility with respect to working hours while the children are in pre-school age. Probably due to strong gender norms, women so far mostly use this opportunity. In this context, it seems difficult to affect labour supply on the margin through economic incentives.[18] Institutional rules about the job protected leave seems to be even more important in this respect, and this margin, we suggest, should be paid more attention in future policy discussions.

[18] This is interesting since economic incentives are of such great importance in the moral hazard literature in the sickness insurance (see for example Johansson and Palme, 1996 and 2005).

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Appendix

Table A 1 Summary statistics for parents: 1989 reform

	Mothers	**Fathers**
Birthyear	1961.46	1958.90
	(4.69)	(5.25)
Monthly pre-birth wage	13,141.42	14,672.61
	(2,261.29)	(3,083.69)
Labour pre-birth income	116,564.20	150,272.80
	(65,243.25)	(90,310.87)

*means and standard deviations

Table A 2 Autumn-Spring differences in pre birth characteristics across years: 1989 reform

	Autumn-Spring difference			**Diff-in-diff**	
	(1)	(2)	(3)	(2)-(1)	(2)-(3)
	1987	1988	1989	DD 88/87	DD 88/89
Mothers					
Birth year	0.434***	0.411***	0.451***	-0.023	-0.040
	(0.045)	(0.043)	(0.042)	(0.062)	(0.060)
Monthly pre-birth wage	-105.407***	-76.855**	7.512	28.552	-84.367
	(37.867)	(37.986)	(41.034)	(53.680)	(56.054)
Pre-birth labour income	-2866.650***	-2492.412***	-1480.300**	374.238	-1012.113
	(623.594)	(617.255)	(610.537)	(878.098)	(868.390)
Fathers					
Birth year	0.448***	0.411***	0.537***	-0.038	-0.126*
	(0.050)	(0.048)	(0.048)	(0.070)	(0.068)
Monthly pre-birth wage	-63.597	-78.670	-94.974	-15.074	16.304
	(68.863)	(71.074)	(70.035)	(99.018)	(99.785)
Pre-birth labour income	-6199.495***	-5237.641***	-5936.478***	961.854	698.837
	(860.562)	(853.894)	(854.091)	(1213.381)	(1208.204)

Table A 3 Estimated effects of the 1995-refrom on mothers' and fathers' fertility

Dependent variable: Accumulated number of additional children respective year since the birth of the first child								
Year:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fathers								
Treated	-0.000654	0.00467	-0.00240	0.00383	0.00168	0.00226	0.00223	0.00182
	(0.00186)	(0.00398)	(0.00447)	(0.00558)	(0.00596)	(0.00584)	(0.00564)	(0.00571)
Observations	24,465	24,465	24,465	24,465	24,465	24,465	24,465	24,465
R-squared	0.051	0.037	0.033	0.051	0.055	0.044	0.044	0.048
Mothers								
Treated	-0.000381	-0.00273	0.000442	0.00142	-0.00474	-0.00152	-0.000814	-0.00298
	(0.00200)	(0.00259)	(0.00234)	(0.00356)	(0.00470)	(0.00466)	(0.00497)	(0.00497)
Observations	41,893	41,893	41,893	41,893	41,893	41,893	41,893	41,893
R-squared	0.054	0.052	0.050	0.071	0.075	0.064	0.066	0.070

Table A 4 Mothers' and Fathers pre-birth characteristics: 1995- and 2002 reforms

	(1)	(2)	(3)	(4)	[(4)-(3)]-[(2)-(1)]
	Dec 1994	Jan 1995	Dec 1995	Jan 1996	DD
Mothers					
Birth year	1966.471	1966.383	1967.149	1967.36	-0.298
					(0.268)
Monthly pre-birth wage	12840.19	12928.49	13393.54	13487.2	-5.349
					(156.787)
Pre-birth labour income	132785	134276.9	133960.3	134406.5	1045.774
					(3117.563)
Fathers					
Birth year	1961.086	1964.104	1964.742	1965.267	2.493
					(2.840)
Monthly pre-birth wage	14708	14440.14	15189.84	15133.49	-211.517
					(299.944)
Pre-birth labour income	174052.2	165340.8	180612.5	176520.7	-4619.531
					(5280.792)
	Dec 01	Jan 02	Dec 02	Jan 03	DD
Mothers					
Birth year	1972.179	1972.496	1973.052	1972.992	0.564**
					(0.236)
Monthly pre-birth wage	18231.95	17676.38	19157.1	19387.59	-824.797***
					(284.076)
Pre-birth labour income	191852.2	184651.5	207235.3	210788.2	-14238.487***
					(4501.862)
Fathers					
Birthyear	1970.002	1970.183	1971.001	1970.888	0.015
					(0.302)
Monthly wage pre birth	21711.23	21416.82	22869.66	22911.31	-50.958
					(467.560)
Labour income pre birth	258994.7	256760.5	279502.9	278454.8	-5102.859
					(8213.726)

Table A 5 Difference-in difference estimates of the 1995-refrom on mothers' and fathers' labour supply and parental leave take-out

Year:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Labour supply Fathers								
Accumulated treatment effect	0.0521	-0.110	0.254	0.679	0.853	0.471	0.725	0.660
	(0.346)	(0.699)	(1.078)	(1.484)	(1.933)	(2.428)	(2.963)	(3.545)
Labour supply Mothers								
Accumulated treatment effect	0.196*	0.517*	0.277	0.136	0.160	0.139	0.808	1.580
	(0.100)	(0.303)	(0.538)	(0.749)	(0.965)	(1.210)	(1.483)	(1.771)
Days with PL benefits, fathers								
Accumulated treatment effect	0.0844	0.224	0.275	0.327	0.326	0.326	0.504*	0.593*
	(0.118)	(0.183)	(0.216)	(0.244)	(0.268)	(0.286)	(0.303)	(0.317)
Days with PL benefits, mothers								
Accumulated treatment effect	-0.294**	-0.359**	-0.192	0.0486	-0.0280	-0.211	-0.281	-0.431
	(0.125)	(0.172)	(0.293)	(0.363)	(0.393)	(0.418)	(0.440)	(0.465)

Table A 6 Difference-in difference estimates of the 2002-refrom on mothers' and fathers' labour supply and parental leave take-out

Year:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Labour supply, fathers							
Accumulated treatment effect	-0.123	0.209	0.676	1.311	*	*	*
	(0.287)	(0.548)	(0.817)	(1.079)			
Labour supply, Mothers							
Accumulated treatment effect	0.0228	-0.0728	-0.438	-0.453	*	*	*
	(0.101)	(0.279)	(0.482)	(0.664)			
Days with parental benefits, Fathers							
Accumulated treatment effect	0.118	0.318**	0.498***	0.544***	0.545**	0.523**	0.550**
	(0.0848)	(0.137)	(0.168)	(0.207)	(0.231)	(0.250)	(0.265)
Days with parental benefits, Mothers							
Accumulated treatment effect	0.158	0.135	0.271	0.189	0.110	-0.116	-0.0992
	(0.119)	(0.157)	(0.242)	(0.301)	(0.331)	(0.358)	(0.384)

Note: Unfortunately we lack data on labour supply for later years, thereby the empty spaces in columns (5)-(7).

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