Estimating the Effect of Maximum Parental Leave Duration on Mothers' Subsequent Labor Market Careers

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Abstract We exploit two major changes in Austrian family policies in the 1990s to analyze the causal effects of changes in parental leave provisions on mothers' subsequent labor market success. Our findings are as follows: (i) Maximum duration of parental leave has a strong impact on the return-to-work behavior as many mothers exhaust the maximum duration of the leave. (ii) Given the time since exhaustion, the maximum duration of parental leave does *not* appear to adversely affect re-entry wages, job durations, and returns to the previous employer. Hence we conclude that a prolonged duration of parental leave does increase the time that mothers can spend with their children, but does otherwise not appear to have detrimental effects on mothers' subsequent employment careers.

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1 Introduction

Do long parental leave (PL) mandates have a detrimental impact on mothers' subsequent labor market success? The most obvious reason why higher take-up of PL provisions has negative consequences for future employment and future earnings is the loss of specific and general human capital that is potentially associated with a long absence from the workplace. Hence previous employers, while obliged to re-employ mothers when they re-enter after the baby break, may either pay mothers relatively worse than their colleagues or may lay off re-entered women with a higher probability as soon as the job protection period upon re-entry has run out. Moreover, the losses in general human capital may also lead to lower pay and less stable employment when women re-enter the labor market at new employers.

The present paper estimates the causal effect of the maximum duration of PL on women's subsequent employment and earnings histories exploiting two PL policy changes that took place in Austria during the 1990s. The first policy change was implemented on July 1, 1990 in Austria and extended the maximum duration of PL from the child's *first* to the child's *second* birthday. As PL in Austria does not only come with employment protection but also with a non-negligible lump-sum government transfer, this large PL extension created strong incentives for new mothers to stay home with their babies for a longer period of time. The second policy change was implemented on July 1, 1996 and effectively reduced the maximum PL duration from the child's *second* birthday to the date when the child turns 18 months old.

To assess how increased PL duration affected fertility and return-to-work choices we rely on a comparison of two interesting groups of mothers: The "treated" who delivered their baby in *July* or *August* 1990 (or 1996); and the "controls" who delivered their baby in *May* or *June* 1990 (or 1996). Such a comparison creates an attractive empirical design that allows us to estimate the causal effect of the maximum duration of PL on mothers' subsequent employment and earnings careers rather precisely.

Our approach has several attractive features. *First*, the assignment of a particular individual to one of the two groups is almost purely random. Endogenous selection does not play a role as parents could not anticipate the PL reform when they made their fertility choices. The reform act was passed by the Austrian parliament not until April 1990 and in January 1990 it was still unclear whether the reform would be implemented at all, and, if so, when the new rules would be enacted. Hence the babies born between May and August 1990 were already conceived when the new PL rules became known to the public. This means that selectivity into treatment and control groups can be ruled out. Furthermore, selectivity by manipulating the date of birth cannot be a major problem either. The 1990 reform created an incentive to postpone the birth date which is nearly impossible on biological grounds. While the 1996 reform created an incentive to speed up the birth event, it is unlikely that manipulation of birth dates have contaminated the comparability of treatment and control groups to a significant amount.

A *second* attractive feature, which is related to the first point, is that observed pre-birth characteristics are almost exactly identical between treated and control groups. This further suggests that the two groups are very well comparable and provides further support for the plausibility for our identifying assumption, that there are no differences between the treated and control groups.

A *third* attractive feature of our empirical strategy concerns the environmental conditions of treated and control individuals. Starting from the date of birth, we follow the earnings and employment histories

of mothers over a period of up to nine years (for the policy change in 1990) and up to five years (for the policy change in 1996) after the birth event. During this extended time interval the labor market conditions for these two groups are (almost) identical. For instance, during the 9-year period after the 1990 policy change over which we follow the mothers' labor market histories, the treated and control groups overlap at least during 9 years and 9 months (May-August comparison). Hence any observed differences between treated and control groups cannot be attributed to differences in environmental conditions between the two groups.

Fourth, the policy change was abrupt. Women who gave birth to a child on June 30, 1990 (or June 30, 1996) faced substantially more (less) generous different rules than women who gave birth to a child on July 1, 1990 (or July 1, 1996). In particular, there were no transition rules that would have mitigated "unfair" differences in PL rules between mothers with a birth immediately before and immediately after the policy change. This allows us to adopt a sharp-design regression discontinuity approach (Hahn, Todd, and Van der Klaauw, 2001).

A *fifth* attractive feature of our empirical approach is a very large and informative data set, the Austrian Social Security Database (ASSD). This database registers not only dates of birth but also the take-up of PL benefits and the work and earnings histories of individuals. This is particularly favorable in the present context, as our goal is to study the return-to-work decisions and subsequent employment and earnings careers of mothers. Furthermore, the ASSD covers the universe of all Austrian employees which allows us to draw very specific but still rather large samples. In sum, the ASSD provides more detailed information on the effects of PL policies than most data sets used in previous studies.

Our findings are as follows. *First*, we find that a longer duration of parental leave induces a significant delay in return to work for the average individual in our samples. We find the probability of being back at work 36 months after birth was almost 11 percentage points lower among mothers with a birth in July/August 1990 than among mothers with a birth in May/June 1990. Similarly, we find that the probability of being back at work 36 months after birth was almost 6 percentage point higher among mothers with a birth in May/June 1996 than among mothers with a birth in July/August 1990. We also find that the difference between treated and controls does not completely fade away over time. For the 1990 sample we find that, even 108 months after birth, the difference in employment rates amounts roughly 3 percentage points (data constraints do not allow a corresponding analysis for the 1996 sample).

Second, we find for both the 1990 sample and the 1996 sample that a majority of mothers exhaust the full PL duration. Moreover, the difference in full exhaustion between treated and controls in both samples is minor. A comparison between pre-birth characteristics reveals that treated and controls are not only almost identical in the full sample but also when we consider only the subgroups of those who exhaust maximum PL duration (the "weakly attached"). We find that changes in maximum PL duration shifts the return-to-work profile (i.e. the dynamics of employment rates since date of birth) by the change in maximum PL duration. In particular, we find almost no differences between treated and controls both in levels and changes of employment rates *after* by time since exhaustion of maximum PL duration, both for the 1990 and the 1996 policy change.

Third, we find, among those women who have returned to work within 36 months after birth,

the group eligible to a *longer* maximum PL duration enjoys *higher* (or not significantly different) average earnings and *higher* (or not significantly different) average durations of post-birth jobs than the corresponding group with a shorter maximum PL duration. (The only exception to this rule are overall job durations after the 1996 maximum PL reduction). This seemingly puzzling result can be resolved by the selectivity in return-to-work behavior. When most productive mothers return to the labor market first, observed labor market outcomes are the effects of both selectivity in return to work and the duration of work interruptions. Hence comparing job qualities started at a given date *after birth* mixes selectivity effects with true effects of longer absence from the workplace.

However, comparing qualities of jobs started within a given *date since PL exhaustion*, such selectivity in return-to-work is no longer important. This is because the data do not show any major difference between treated and controls in levels and dynamics of employment rates after maximum PL duration. Hence differences in associated jobs qualities are less likely due to selectivity and should be informative on the true effect of work interruptions on labor market outcomes. We find that the 1990 extension in maximum PL duration did not significantly affect the earnings and durations of post-birth jobs. For the 1996 policy change we do not see a significant difference in job durations, but higher earnings for jobs that were started after full PL. For jobs started before full PL exhaustion, we find shorter durations but not significant differences in earnings.

The paper is organized as follows. In the next section, we briefly discuss related previous literature. Section 3 discusses institutional features of the Austrian labor market and describes in detail the 1990 and 1996 PL policy changes. Section 4 presents and discusses our empirical strategy. Sections 5 and 6 present the empirical results both on the extension and the reduction of PL. Section 7 concludes.

2 Previous literature

Our paper studies the issue of how women's work interruptions due to child bearing and rearing affect their subsequent earnings and employment careers. An important literature has focused on the effects of maternity and parental leave policies that are typically associated with longer absence from the workplace. Our analysis differs from most of this literature in at least two ways. First, we present an empirical design that assess the causal effects of PL duration on the duration of absence from the workplace. Second, while most of previous studies focus on the effects of the U.S. Family and Medical Leave Act which grants a rather short (12 weeks) period of job-protected unpaid leave, our study focuses on variations in rather long leaves that are not only job protected but also associated with a non-negligible government transfer. A further differences between our study and the existing literature is that our analysis discusses the PL duration-effect on both employment and earnings, while the majority of previous studies has focused on PL effects of either earnings or employment separately.

Studies focusing on the U.S. have either used state variation in PL provisions or have analyzed the impact of the 1993 U.S. Family and Medical Leave Act. Klerman and Leibowitz (1997) find that changes in maximum PL durations across U.S. states does affect the duration of leaves but does not signficantly affect female employment. Klerman and Leibowitz (1999) find that the introduction of the U.S. Family and Medical Leave Act in 1993 did not have any major impact on the return-to-work

behavior of young mothers. Waldfogel (1999) finds that the FMLA had no significant impact on wages and employment in CPS data. Han and Waldfogel (2003) studying the impact of leave entitlements (paid versus unpaid) and find that paid-leave policies are more likely to affect times off work. Berger and Waldfogel (2004) find a close association between FMLA coverage and return to work. Women with pre-birth employment take up leaves but return quickly after having exhausted PL duration. Baum (2003a) finds small effects of FMLA on employment and Baum (2003b) shows that U.S. maternity leave legislation has small and statistically insignificant effects also on wages suggesting that PL are too short, is unpaid, and other rules (minimum employer size) excludes many woman from the rules. This is confirmed by Hashimoto et al. (2004) who find small and only temporary effects of maternity leave.

PL rules in other countries are more generous and hence more likely to have an impact on the labor supply behavior of mothers. Baker and Milligan (2005) exploit the substantial variation in PL provisions over time and across Canadian provinces (ranging from 17 and 70 weeks) to study how such policies affect the amount of time that mothers spend with their children. They find both short and long mandates increase job continuity (i.e. the fraction of women returning to their pre-birth employer). However, only long (but not short) leaves increase the amout of time that mothers spend with their children. This is important, as most welfare-enhancing effects of PL legislation work via its effects on the amount of time that mothers spend with their very small children.

Ruhm (1998) as well as Ruhm and Teague (1997) show, using panel data on PL provisions across European countries, that womens' attachment to the labor force increases as with the duration of PL mandates. Pylkkänen and Smith (2004) find that the impact of PL and other family policies has a strong impact on mothers' career interruptions in Denmark and Sweden. Furthermore, the more flexible Swedish system where parents can split PL and times on partenal leave can be saved now and used up later lets women adopt more strongly to policy changes as opposed to Denmark, where the PL system does not allow for such flexibility. Ondrich et al. (1999) show that changes in maximum leave durations in Germany in the 1980s had a significant impact on the time that mothers spend with their children. Merz (2004) argues that much of the observed long-term changes in changes in hours worked by married women can be explained by changes in parental leave legislation.

Schönberg and Ludsteck (2005) use an identification strategy similar to ours and evaluate the causal effects of several PL changes that took place in Germany since the 1970. Similar to our paper, they find only minor effects on employment rates as a results of longer leave. Unlike our results, however, they find a strong and persistent wage penalty for longer leaves even 8 years after childbirth. Hanratty and Trzcinski (2005) analyze the increase in maximum PL duration from 20 to 50 weeks that was implemented in Canada in 2000. They find that the PL extension was associated with a substantial increase in the time that Canadian mothers (compared to U.S. mothers spent with their small children. However, relative employment rates one year after birth were largely unaffected.

Ejrnaes and Kunze (2006) investigate the family wage gap using administrative data for Germany. They find that longer maximum durations of PL leads to detrimental effects on employment and wage outcomes. Moreover (and unlike our study) they find negative selection in return-to-work meaning that the most productive workers are less likely to return to work.

3 The institutional environment

3.1 The Austrian PL system

Austria was among the first countries to adopt a PL legislation. The system was introduced in 1957 when mothers were protected from dismissal of the previous job for a period of 6 months. Two major reforms took place in 1961 when the maximum duration of PL was extended up until the child's first birthday and a means-tested transfer payment proportional to the unemployment benefit was introduced; and in 1974 when the transfer became flat rate and independent of household income.

The rules that were in place during the 1990s required a minimum employment experience. Women taking up PL for the first time, had to have worked (and paid social security contributions) for at least 52 weeks during the two years prior to birth. For mothers with at least one previous take-up of PL the employment requirements is reduced to 20 weeks of employment during the last year prior to the subsequent birth. PL comes with two major advantages. First, mothers are eligible to a flat rate transfer amounting to about 340 Euros per month (in 1990) or about 31 % of gross median earnings of female workers. Benefits are not means tested and not taxed implying a median *net income* replacement ratio of more than 40 %. Women without a partner or with a low-income partner are eligible to higher benefit levels (Sonderunterstützung). Second, PL provides protection of the mother's previous job. A mother can return to her previous employer and is protected from dismissal during the first 4 weeks after returning to work.[1]

Prior to *July 1, 1990*, the maximum duration of PL ended with the child's first birthday, after *July 1, 1990*, the maximum duration of PL was extended until the child's second birthday. [2] A further policy change took place *after July 1, 1996*. At that date, the maximum duration of PL still lasted until the child's second birthday. However, the new rules required that at least 6 months of the leave had to be taken by the father. As fathers' take-up of PL is negligible, the 1996-reform effectively implied a reduction in maximum parental duration from the child's second birthday to the date when the child became 18 months old.[3] The 1996 reform brought also a slight increase in previous employment requirements for second and subsequent birth. Instead of originally 20 weeks within the last year,

[1] The effective duration of job protection is much longer than these four weeks. In Austria, layoffs are subject to advance notice regulations implying that a mother's job is protected for several months after returning from parental leave.

[2] The 1990 policy reform came with several additional changes. The system was changed from a "maternity" to a "parental" leave system. Not only the child's mother but also the father could go on parental leave. However, this is of no practical consequence. In 1990 less than 1 % of fathers took advantage of that possibility. A second change was that women in farm households and family businesses as well as women who did not meet the employment requirements became eligible to a transfer equal to 50 % of regular parental leave benefits up until the child's second birthday. This is of no importance in the present analysis because we confine ourselves to study behavior of female dependent employees. Furthermore, the reform made it possible to take part-time parental leave, either between child's first and second birthday (by both parents at the same time) or between child's first and third birthday (only one parent or both parents alternating).

[3] A further major policy change took place in 2002. There were two major changes. First, transfer payments (Kinderbetreuungsgeld) was increased and granted for a period of 3 years (rather than at most two years as under previous rules). Furthermore, transfer payments become became independent of previous work requirements (so also other previously non-covered group became eligible). Third, mothers could go on leave for two years again and, during the leave period, earn labor income up to 14,500 Euros during the period when benefits are drawn. We do not discuss these changes in more detail, as our data do not allow us to study this most recent change.

women had to spend 26 weeks within the last year in employment.

3.2 Other fertility related family policies

Besides PL benefits, fertility-related family policies in Austria consist of a broad set of measures that we only briefly discuss here. Like in many other countries, there are special rules that protect mother and child around the period of confinement (which were initially adopted as protection from health-damaging work environments). This period of *maternity protection* lasts for 16 weeks (usually 8 weeks before and 8 weeks after the actual birth). During this period women are insured against the risk of dismissal and an associated transfer equal to the average wage rate over the last quarter prior to the birth. Formally, the PL period starts when the maternity protection period ends.

A further transfer to which parents are eligible are *child benefits* (Familienbeihilfe). There is universal eligibility to these benefits (meaning that all parents with sufficiently long residence in Austria are eligible). These benefits amounted to about 95 Euros per month for each child below age 10, and to 110 Euros per month for each child between ages 10 and 19). The tax system has *tax deductions for children* (Kinderabsetzbeträge), that increase with the number of children. Furthermore there is a *birth benefit* (Geburtenbeihilfe) of Euro 1090 that is paid out to mother in several steps upon medical inspections between the child's birth and its fourth birthday. The supply of *child care facilities* for small children is rather low. According to OECD (Employment Outlook 2001) the proportion of children under age 3 enrolled in child-care arrangements was only about 4 % in 1998 which is very low be international standards. [4]

While the most significant changes in fertility-related family policies during the 1990s concerned changes in PL legislation, several other minor changes were made with respect to other family policies. In 1997 the birth benefit was abolished. In 1998 there was a major effort by the central government to improve the supply of childcare facilities in public kindergardens (Kindergartenmilliarde). However, this increase in government spending was targeted towards the age group 4-6 rather than the very small children.

4 Data

We use data from the Austrian social security register (ASSD). The ASSD consists of administrative individual register data collecting information relevant for old-age social security benefits. As these benefits depends on individuals' earnings and employment histories, the data set reports individuals' complete employment histories since 1972 for the universe of Austrian private sector workers. Furthermore, not only employment histories, but also time with childbearing and rearing ("*Kinderersatzzeiten*") are relevant for old-age social security benefits. This is why the ASSD also reports high-quality information on the number of births by female employees with previous social security contributions.

[4]For instance, the comparable number for the U.S. is 54 %, for Denmark, Norway and Sweden 64 %, 40 %, and 48 %, respectively. Germany, and southern European countries have similarly low levels of child care facilities for kids under age 3 (These number include both public and private child care provision such as group care in child-care centres, residential care, childminders based in their own home, care provided by person who are not a family-member; see OECD Employment Outlook 2001).

The ASSD has several obvious advantages which will be of particular importance for the empirical strategy developed below. First, the data set covers the *universe* of the private sector employees in Austria implying we can rely on large samples, even when very specific groups are considered. Second, the data reports, on a daily basis, the occurrence of a birth and take-up (and durations) of maternity protection and PLs since the year 1972. This allows us to determine precisely both the PL eligibility status as well as the maximum duration of PL of mothers. Third, as all employment and earnings over an individual's life cycle are reported in the data, we can look in a very detailed way at the joint distribution of fertility and labor supply behavior of mothers over extended time periods.

5 Econometric method

We use a *regression discontinuity design* to assess the effects of maximum PL duration on mothers' subsequent labor market success careers. Let T denote the date of birth of a child, Y the labor market outcome variable (employment status, earnings, job durations, etc.) and D the treatment indicator (with $D = 1$ if maximum PL duration lasts until the child's second birthday, and $D = 0$ if maximum PL duration ends already with the child's first birthday).

Assignment to treatment is a discontinuous function of the date of birth T. All mothers giving birth to a child on or after July 1, 1990 (t_0) are entitled to the prolonged PL duration, whereas all mothers giving birth to a child earlier are denied the extended PL duration. We draw two samples from our raw data. The control sample consists of women who gave birth to a child between May 2 and June 30, 1990; the treated sample consists of women who gave birth to a child between July 1 and August 29, 1990. Because the ASSD covers the universe of all individuals who, at some previous date, paid social security contributions, and because the ASSD also reports all births by these individuals, we end up with a sufficiently large data set comprising of 12,639 observations.

While our data set does not report the PL eligibility status directly, we observe actual PL take-up. Thus, we can investigate how strongly the duration of PL changes as a function of calendar time. Figure 1 reports average durations of PL durations on a daily basis starting from May 2, 1990 to August 29, 1990. The data show very clearly that, within three years immediately after the birth, mothers who deliver their baby before July 1990 are on parental for roughly one year. In contrast, mothers who gave birth after June 1990 the corresponding number is almost twice as high, on average about 1.8 years. Importantly for our empirical strategy, there is no trend in average PL durations within the period before the PL change and within the period after the PL change.[5] This means that assignment to treatment changed discontinuously between June 30 and July 1, 1990 without any transition rules.

Figure 1

Thus $E(D|T = t_0 + \epsilon) = 1$ and $E(D|T = t_0 - \epsilon) = 0$, i.e. assignment to treatment is "sharp" in the terminology of Hahn et al. (2001).[6] Thus, an intuitively appealing contrast that infers the causal effect of extended PL is the following

[5] Notice that take-up of parental leave is itself an endogenous variable. However, as most mothers use up the eligibility period, this indicator is informative on the treatment intensity.

[6] Note that in the analysis, we treat time as discrete with the smallest time unit equal to 1 day. This guarantees, that the density of births at t_0 is non-zero.

$$E(Y|T = t_0 + \epsilon) - E(Y|T = t_0 - \epsilon)$$

It can be shown that for $\epsilon > 0$ sufficiently small, this contrast identifies the average effect of offering extended PL duration on the spacing of births for mothers giving birth when PL was extended (Hahn et al. 2001).[7] In the empirical analysis we report results based on $\epsilon = 60$ calendar days. More precisely, we compare "treated" young mothers who gave birth in July/August 1990 to "control" young mothers who gave birth in May/June 1990.

There are several reasons why a comparison of these two groups is informative on the *causal* effect of PL legislation on fertility and return-to-work supply behavior. First, observed characteristics of the two groups are very similar. This is what we would expect if assignment to treatment is random. Panel A2 of Table 1 shows that the two groups are very similar in terms of their background characteristics. In both samples, more than 75 percent of all births occurred in mothers' age group 20-29 and about 13-14 percent at ages 30 and above. Both groups were roughly 1.5 years in employment and .12 years in unemployment during the past two years. All other job characteristics, like average income per day[8] (and its associated standard deviation), white collar employment, and the distribution of previous employment across industries and regions are almost identical between the two groups. While the two groups are very similar, they are not completely identical. Our analysis below will therefore use regression analysis which controls for these individual characteristics.

Table 1

A *second reason* refers to the way the treatment status is assigned to individuals. As we focus on births that took place during the rather short period four-months period May until August 1990, this comes close to a random assignment of treatment status to individuals. We performed a newspaper content analysis of the major Austrian newspapers which showed that the public discussion started in November 11, 1989 – seven and a half months prior to the final implementation of the change. At that time it was neither clear whether, when, and how extended PL would actually be introduced. While, on November 15, 1989, there was the proposal that extended PL should be introduced on July 1, 1990, on November 16, 1989, 21 pro-business members of the parliament announced that they would block a law extending PL. On January 5, 1990, the headline of an article of the "Neue AZ" regarding family policy announced that the policy of "Extension of PL Has Failed". It took until April 5, 1990, that the press finally declared that the ruling coalition (social-democrats and conservatives) had found a political compromise. In sum, the chronology of the public PL reform debate suggests that it was unclear until 3 months prior to the policy change whether and under which conditions the PL would be extended. Hence it is impossible that the fertility decisions that lead to birth of child between May and August 1990 were influenced by parents' anticipation of the July 1990 policy change.

[7] When assignment to treatment is sharp, $E(Y|t_0 = t_0 + \epsilon) - E(Y|T = t_0 - \epsilon) = E(Y_1 - Y_0|T = t_0 + \epsilon) + E(Y_0|T = t_0 + \epsilon) - E(Y_0|T = t_0 - \epsilon)$ with Y_0 denoting the non-treatment outcome $D = 0$ and Y_1 denoting the treatment outcome $D = 1$. For $\epsilon > 0$ sufficiently small, this contrast identifies the average effect of treatment at calendar time t_0 – $E(Y_1 - Y_0|T = t_0)$ – provided that $E(Y_0|T)$ is continuous in t_0.

[8] Income per day is total labor income divided by the number of days worked in a given year. Note that this income per day measure does not reflect differences in hours worked. There is no information on hours worked in the ASSD.

A *third reason* why our results are reliable comes from the time-proximity of the sample selection dates of the pre- and post-observations relative to the (comparably long) time interval over which we observe mothers' fertility and labor supply behavior. While samples are selected from birth occurring over only 4 successive months, we will focus on women's labor market outcomes over (at least) the first 36 months following the birth. Hence any differences between treated and controls cannot be attributed to differences in environmental conditions between the two groups. In fact, during the 36 months treated and controls have an *identical* economic environment during at least 33 months following the birth. Hence a typical problem that contaminates pre-post comparisons, differences in pre/post conditions, cannot be of importance in the present context.

6 Descriptive evidence on the effects of the 1990 PL extension

In what follows we look at the labor market effects of the July 1990 policy change. We first focus on return-to-work behavior as well as the quality of new jobs (as measured by earnings and job duration) at given dates after birth. We then focus more closely on the relationship between the time of re-entry and the associated job quality.

6.1 Employment and job quality after child birth

Return-to-work. We first examine the return-to-work probability of a mother who took up PL after giving birth to a new child between May and August 1990. A simple and obviously interesting question is how employment and job qualities given employment differ between the treated and control groups at a given point of time after the birth of a child. In what follows we will concentrate on the date when the child turns three years old. At this date, maximum PL duration has run out, and differences in employment rates should be due to long-term effects of maximum PL duration and are unrelated to PL take-up. (For instance, we should see no differences in employment rates when all women fully exhaust their PL duration and thereafter return with a constant probability to the workplace.)

Figure 1 shows, by birthday of the child, the probability that a mother returned to work before the child was 3 years old. Among the control group, mothers who gave birth to their child between May 1 and June 30, 1990, roughly 60 percent of mothers went back to work within three years. Among mothers who gave birth to their child after the policy change, between July 1 and August 30, only 50 percent of mothers were back at work within the same period. There is no trend in this indicator before the policy change and only a very small upward trend after the policy change. The difference between the two groups is mainly driven by the discontinuous policy change on July 1. Figure 2A clearly suggests that the increase in PL duration had a large negative impact on mothers' subsequent employment rates.

Figure 2A, 2B

Parental leave mandates grant employment at the same firm in a position comparable to the pre-birth job. Hence it is suggestive to ask how many women returned to the same employer upon re-entering the labor market. Figure 2B displays the percentage returning to the same employer as a fraction of all women returning to the labor market before their kid became 3 years old. Among the control group,

somewhat more than 60 percent returned to the same employer, among the treated group almost two thirds among the returning women took up a job at their previous employer. This suggests that, while employment protection is an important element in the PL policy, for a substantial fraction of women protection of the previous job is irrelevant because they found a different job at a different employer. This group takes advantage of PL transfers only.

One might argue that evaluating the employment status 36 months after the birth is too short a time interval to infer the long-term effects caused by the extension of maximum PL duration. To shed light on the long-run employment effects we look at return-to-work within nine years after birth. Figure 3 shows that differences between treated and control groups in take-up of employment after birth are long-lasting. Whereas among the control group almost 82 percent of all mothers have returned to work within nine years after birth, only 79 percent among the control group have returned. This suggests that the extension of PL duration has non-negligible detrimental labor supply effects even in the long run.

Figure 3

The quality of post-birth jobs. The above analysis has shown that longer PL leads to a substantial delay in taking up employment after birth. A further interesting question is: what is the labor market success of mothers who have re-entered the labor market? Are they paid equally well than before? How long do their jobs last? In particular, does the maximum length of PL affect earnings and job stability?

Addressing this question is difficult. The existing evidence in Figure 2 and Figure 3 suggests that parental leave duration affects return to work duration strongly. This means that the composition of the treated and control group returning to work within 36 months after birth could be different. We nevertheless provide first descriptive evidence on the differences between these groups. We then propose a second way to assess the effects of parental leave duration on the quality of post birth jobs that is less strongly affected by possible selection effects.

Figure 4A sheds light on the question whether and how PL duration affects the quality of jobs upon re-entry. It shows the average duration of the first job taken up by mothers within the first 36 months after the birth. The average duration of these jobs is less than two years, which is a relatively short period. (In contrast, the average duration of the pre-birth job was more than three years both for the treated and the control group, see Table 1). The average duration of the new job is somewhat more than 19 months for the control group whereas the average duration of the new job for the treated group is almost 23 months.

Figure 4A, 4B

Figure 4B displays the changes in log relative earnings per day of mothers who started a parental leave between May and August 1990. Relative earnings are nominal earnings in year t divided by median earnings in year t to account for secular changes in the price level of productivity. Women who gave birth to a child in May/June 1990 (eligible to a one-year PL) experienced a decline in earnings of about 23 percent. In contrast, women who gave birth to a child in July/August 1990 (eligible to a

two-year PL) experienced a much smaller change, on average by less than 17 percent. Why is there a reduction in earnings in the first place? This may be due to two reasons. On the one hand, women may reduce hours worked. Taking care of a small kid is time-consuming and exhausting, and increases the disutility of labor. Therefore, a reduction in earnings due to reduced hours is a likely response of women with small children. On the other hand, earnings may be lower because the double burden of work and child care as mothers of small kids are less able to work under pressure and/or are more often absent from the workplace than their childless colleagues. This reduces expected productivity and results in lower pay. We are not able to separate these two effects because the ASSD reports daily earnings, but not hours worked.[9]

Figures 4A and 4B reveal a puzzling results. Mothers taking up longer leaves have better jobs after the baby break. The average post-birth job of mothers belonging to the treated group do not only last longer but are also better paid than the post-birth jobs of mothers belonging to the control group. This is surprising because, after all, one would expect that longer work interruptions lead to a penalty on the labor market. However, Figure 4A and 4B suggests that exactly the opposite is true. In principle these changes could have two different reasons.

On the one hand, the longer PL duration allows mothers to stay longer with their kids and avoid the double burden of child care and work for a longer period of time. This may have positive effects on mothers' productivity or on their disutility of work at later dates. When a returning mother exhausts her full PL duration, control mothers have to return when their baby becomes one year old whereas treated mothers have to return not until their baby becomes two years old. The former are confronted with a situation where the baby needs much more care than the latter. Employers may anticipate such productivity effect, resulting in worse job quality outcomes. A further reason might be intertemporal substitution of labor supply. To compensate the earnings loss associated with longer leaves may induce women to exert more effort on the post-birth job leading to better outcomes of the post-birth job.

As we argue above, a different explanation for the surprising evidence of Figures 4A and 4B – an explanation that we explore in more detail below – is selectivity in return-to-work behavior. Suppose the most productive women return to work first.[10] Then longer leaves induce the less productive women to delay return to work. In fact, as Figures 2 shows the percentage mothers returned to work 36 months after the birth is almost 10 percent lower among the treated group. Hence the difference in earnings may simply reflect differences in average productivity between treated and control groups resulting from their return-to-work behavior.

[9]Some indication for the relative importance and wage- versus hours-effects may be revealed by comparing women returning to the same employer and women taking up new jobs. Employment protection of PL-rules grant women returning to their previous firm the same (or an equivalent) job. Hence changes in their earnings of women returning to same employer are most likely due to changes in hours rather than changes in hourly. Table 1 reveals that, in fact, earnings losses among women returning to the same employer are much smaller, both for the treated and the control groups. Moreover, differences in earnings between treated and control groups are smaller (3 percentage points in the previous-employer subgroup instead of 7 percentage points in the whole sample).

[10]Alternatively, the household income situation of a women may affect the decision to return to work. Financially constrained women might decide to re-enter the labor market early and to work longer hours.

6.2 Job quality by time of re-entry

The above analysis so far leave us with one clear result and one puzzle. Return-to-work behavior a priori is in line with expectations. Extended maximum PL duration causes delayed return to work (both to the old employer and to new jobs) both in the medium run (within 36 months after birth) and in the long run (within 108 months after birth). This suggests many mothers take advantage of the more attractive possibility to spend more time with their small children. On the other hand, our analysis revealed the surprising result that both the stability and the earnings of the new job were significantly higher among treated mothers than among the control mothers. In this section we develop an explanation for this puzzle by exploring in more detail earnings and job durations at different dates of re-entry.

To shed light on the evolution of job qualities by timing of re-entry of treated and control groups we first study how the percentage re-employed evolves since the birth of the child. Figure 5A shows the probability that a mother returned to work at month t after the birth of her child, both for the treated group (solid line) and the control group (dashed line). The first vertical bar indicates the end of PL for the control group (12 months after birth) the second vertical bar indicates end of PL for the treated group (24 months after birth). The figure reveals that, for a large fraction of mothers, maximum duration of PL is a binding constraint. Less than 20 percent among controls and only slightly more than 20 percent among the treated returned to work before PL has run out. For both groups, almost exactly the same fraction of mothers (58 percent) were still not at work after PL was exhausted. Thereafter, the percentage re-employed increases gradually.

Figure 5A, 5B, 5C

Figure 5B shows the change in log relative earnings by date of re-entry into the labor market. By relative earnings we mean the earnings level of a women relative to median earnings employed in the private sector at the particular date. Deflating by median earnings accounts for both inflation and productivity growth. A data point at quarter t is based on re-entry earnings of those mothers who entered the labor market between after-birth quarters t and $t+1$. Women entering before PL exhaustion do suffer smaller earnings losses than women entering after PL exhaustion. Both for the treated and the controls, these losses are below 10 percent for early re-entrants (the "highly attached"), and much higher than 10 percent for the late entrants (the "weakly attached"). Figure 5C shows the corresponding graph for post-birth job durations. Again, one data point gives the duration of a job started between after-birth quarters t and $t-1$. No clear correlation between duration of post-birth jobs and quarter of re-entry emerges, albeit that jobs started before (but not at) PL exhaustion by the treated seem to last longer than jobs started after PL exhaustion.

To see the differences between treated and controls more clearly, it is instructive to focus on the interesting variables *by time since/to PL exhaustion*. This is shown in Figure 6. By construction of this figure, the vertical line indicating PL exhaustion coincides for treated and control groups. Figure 6A shows that return-to-work behavior is very similar between the treated and controls, as almost the same percentage treated and control mothers have returned to work at any given months after PL exhaustion. Major differences between treated and controls occur only at dates before PL exhaustion. However,

after the date of PL exhaustion, there are no important differences in percentage mothers back at work. Both for the control group and the treated group somewhat more than 40 percent are back at work when maximum PL has lapsed. Thereafter the transition rate back to work is almost identical between the treated and control mothers leading to almost identical return-to-work probabilities by date since PL exhaustion of the two groups.

Figure 6A, 6B, 6C

Figure 6A suggests that, before and after the policy change, a large fraction of women (roughly 25 percent among the treated and 17 percent of controls) fully exhausts the maximum duration of PL and immediately returns to work. For this group, the delay in the return to work due to the July 1990 PL extension is exactly one year. Figure 6A also shows that, given time since PL exhaustion, the return-to-work graphs of treated and controls almost exactly coincide. This means that not only women returning to work immediately after PL-exhaustion but also treated women returning to work at a later date delay their return to work by exactly one year.

The evidence in Figure 6A suggests that PL exhaustion divides the sample into two groups: a first group which has a high work attachment and exits from the PL status directly back to work without any intermediate spell of non-employment; and a second group which has a lower work attachment and exits the PL status to non-employment and returns to work (if at all) at a later date. Moreover, the fact that by the end of parental leave an equal share of the initial population has returned suggests that the pre-existing differences in terms of background characteristics between the two groups might be small. In particular, we expect that if the sorting hypothesis is important (the most productive women re-enter the labor market earlier than the less productive women), we should see that pre-birth wages decrease with time of return to work. Table 1 gives an indication that this is actually the case. Panel A1 shows that the average pre-birth earnings of the whole sample were roughly 500 ATS, both for the treatment and control groups. Panel A2 looks at the corresponding wage for the subgroups of women who returned to work last, as they exhausted the maximum PL duration. The average wage this groups is less than 470 ATS (which compares to an average pre-birth wage of 545 ATS or more than 15 percent of women who did not exhaust maximum PL duration – not shown in the table). Moreover, pre-birth tenure and employment were slightly higher, and pre-birth unemployment was lower for the overall sample as compared to the weakly attached women.

From the identification point of view, Table 1 Panel A2 provides an important finding. The weakly attached mothers are – on average – very similar. This suggests that there is selection into work but selection is identical relative to the time when parental leave is exhausted. Hence Table 1, panel B2, shows that extended PL does neither change the relative size nor the composition of the highly and weakly attached groups. Moreover, the same fraction of mothers are back at work at given dates since PL exhaustion. This suggests that, conditional on time since PL-exhaustion, differences in cohort quality should be of minor importance. Observed post-birth differences between treated and controls in labor market outcomes can most likely be attributed to the increase in maximum PL-duration. Endogenous sorting is unlikely to play any major role.[11]

[11] A further test of this assumption would be to estimate the effects of extended parental leave duration on labor market

Figure 6B shows the differences in log earnings changes between treated and control groups by time since PL-exhaustion. Earnings losses are minor for mothers who return to work before exhaustion whereas these losses are much bigger for mothers exhaustion their PL and returns to work later. No major differences in log wage changes between treated and controls occur for mothers who did not exhaust PL. Interestingly, the largest differences between treated and controls shows up during the first 6 quarters after PL exhaustion. It turns out, despite their longer work interruption, the treated suffer *smaller* rather than higher earnings losses than controls. During the first 6 quarters after PL exhaustion earnings losses among the treated are always lower than 20 percent, whereas the losses of controls during these dates are close to 30 percent. Hence longer work interruptions due to longer PL durations do not result in higher wage losses. At later dates, no significant differences in earnings losses show up.

In Figure 6C, we examine durations of post-birth jobs. The figure shows that post-birth jobs starting before full exhaustion of PL last longer among the treated than among the controls, the difference being non-negligible. However, for jobs started by mothers who fully exhausted PL and who started their post-birth job after at least one quarter of non-employment, we see not much longer post-birth jobs among the treated than among the controls. In sums, our descriptive graphical analysis shows that the longer work interruptions induced by the July 1990 PL extension, did not result in more unstable post-birth jobs.

7 Effects of the 1996 PL reduction

The analysis above has focused on an extension of maximum PL duration that was introduced in July 1990. On July 1, 1996 the Austrian parliament enacted a reduction in maximum PL duration. The policy change was mainly introduced for budgetary reasons as it turned out that take-up of extended PL was very high and government expenditures were increasing a lot. What was the effect of this reduction in maximum PL duration? Did the 6-months reduction in 1996 lead to changes in mothers' labor market outcomes comparable in magnitude to those of the one-year extension? In what follows we look at the labor market effects of the July 1996 policy in a very similar way as we analyze the 1990 policy change.

Figure 7 reports PL take-ups following a birth between May 1, 1996 to August 30 on a daily basis. Mothers who gave birth before July 1996 took up on average about 1.8 years of PL within the 36 months following a birth. Again, there is no trend in average PL durations at birthdays immediately before and immediately after the policy change. Assignment to treatment changed discontinuously between June 30 and July 1, 1990.

Figure 7

Figures 8A and 8B show, respectively, the percent women returned to work and the percentage re-employed with the same employer among all re-employed. Within 36 months after childbirth, roughly

success in the context of a Heckman-type selection model. Note, however, that the current setting does not offer a convincing exclusion restriction.

60 percent among controls were back at work[12]. Among the treated group (with six months lower maximum PL duration), the percentage women back at work is 66 percent. Hence the reduction in maximum PL duration induced mothers to bring forward the date of re-employment. The magnitude of this labor supply reaction is of a size comparable to the 12-months increase in the maximum duration of PL. While the 1990 policy change brought about a 11 percentage point reduction in the probability of returning to work within 36 months after childbirth, whereas the 1996 policy change brought about a 6 percentage point increase in that probability. Figure 8B shows that, for both groups, roughly two third of all re-employed women took up their previous job.

Figures 8A and 8B

How do post-birth job durations and post-birth earnings differ between treated and control groups? Figures 9A and 9B show that the average duration of post-birth jobs are slightly higher among the treated group, whereas average earnings of treated do not differ significantly at the threshold. In this dimension, the effects of the policy change seem to be somewhat different from what we saw in during the 1990 policy change (where both earnings and job durations were significantly higher among the group enjoying the longer maximum PL duration). However, the analysis does not control for observed characteristics so a direct comparison between the two groups might be misleading.

Figure 9A and 9B

Finally, let us look at the dynamics of re-employment and the associated job outcomes. Again, the first vertical bar now indicates the end of PL for the treated group (18 months after birth) the second vertical bar indicates end of PL for the control group (24 months after birth). The picture from the 1996 PL-reduction is qualitatively very similar to the 1990 PL-extension (see Figure 5A above). For a large fraction of mothers, maximum duration of PL is binding and only about 20 to 25 percent return to work before PL exhaustion. For treated and control groups, almost exactly the same fraction of mothers (roughly 50 percent) were still not at work after PL was exhausted. Thereafter, the percentage re-employed increases gradually. Figure 10B shows the change in log earnings by date of re-entry into the labor market. The 1996 sample experienced earnings losses that are much larger than those in the 1990 sample which implying that part-time jobs have become more common during the 1990s. The dynamics of earnings losses by time of re-entry, however, are qualitatively very similar to the 1990 extension. Highly attached women (entering before PL exhaustion) do suffer smaller earnings losses than the weakly attached who re-enter the labor market after a period of non-employment. Figure 10C show the corresponding dynamics for job durations by date of re-employment. Jobs started before PL exhaustion tend to last longer, both for the treated and the control groups.

Figure 10A, 10B, 10C

Just like in our above evaluation of the 1990 PL extension, let us focus on the interesting variables by time since/to PL exhaustion (Figure 11). Figure 11A shows that return-to-work behavior by time

[12]Notice the difference in return to work behavior between the July/August 1990 group and the May/June 1996 group. Both groups were eligible to 2 years of maximum PL. A comparison between Figures 8 and 2 shows that 60 percent of the 1996 cohort but only 50 percent of the 1990 cohort had returned to work within 36 months after birth. This reflects the trend of increasing female labor force participation.

to PL exhaustion is very similar between the treated and controls. Just as in the 1990 policy change major differences between treated and controls occur only at dates before PL exhaustion. According to Figure 11A roughly 50 percent of all women fully exhaust the maximum duration of PL and do not immediately return to work thereafter. Because the two graphs in Figure 11A almost exactly coincide after PL exhaustion, we conclude that the 1996 PL reduction induced the "weakly attached" to return to work 6 months earlier. Figures 11B and 11C show the dynamics of earnings losses and post-birth job duration by re-employment date. The important message is that, one maximum PL has run out, not major differences between treated and control groups remain, neither with respect to earnings nor with respect to job stability. (Notice however, that earnings observations occur 6 months earlier for the treated group than for the control group generating a too favorable picture for control group as a results of wage increases over calendar time.)

In sum, our descriptive graphical analysis of the July 1996 PL reduction generates a qualitatively similar picture – with opposite signs – than the July 1990 PL extension. Shorter PL duration induce women to return significantly earlier and the quantitative effect (per marginal month of PL duration) is comparable to the effect obtained for the 1990 PL extension. Similarly, patterns in return to work are significantly shaped by maximum PL duration and its reduction by 6 months induced treated women who exhausted their full PL duration to return to work 6 months earlier than women in the control group. The dynamics of earnings and job qualities after the 1996 PL reductions are also similar qualitatively similar to those of the 1990 PL extension. We should be aware, however, that the various data points shown in the figures comprise a not completely homogenous population. Hence in calculating the effect of PL changes, controlling for individual characteristics is potentially important. This is what we do in the econometric analysis of the next section.

8 Econometric results

This section presents the econometric results regarding the effects of parental leave duration on labor market outcomes.

The main purpose of the empirical analysis is to identify the change in outcome y that occurs because due to a change in parental leave duration in the new regime $D = 1$ rather than in the old regime, $D = 0$. The main variable assigning mothers to treatment regimes is the child's birthdate T. Thus, $D = I(T > t_0)$, $I(A) = 1$ if A is true, and $I(A) = 0$ otherwise, and t_0 is the day of policy change. It is therefore important to model the correlation between day of birth and the outcome variable appropriately. The regression model we use is

$$y_i = \beta_0 + \beta_1 D_i + \beta_2 D_i(T_i - t_0) + \beta_3(T_i - t_0) + x_i'\gamma + \epsilon_i \tag{1}$$

This regression model identifies the effects of changes in parental leave duration conditional on observed characteristics x_i and it allows for a linear effect of day of birth T_i on labor market success y_i that is allowed to differ in the pre- and the post-policy change period.[13] The control variables x_i are age,

[13]Lalive (2006) shows that this model is very robust in estimating the causal effects of extended benefit duration on unemployment duration. Table A1 in the appendix shows that the trend in days to policy change is not important. This is, arguably, due to the fact that we have adopted a narrow window of two months around the date of policy change.

pre-birth tenure (in years), pre-birth employment, pre-birth unemployment, white collar occupation, and income per day (in 100 ATS), firm location, and firm industry.

Table 2 presents the main results. Prolonging parental leave duration by 12 months (1990 extension) leads to an increase in parental leave take-up by almost 10 months (or 0.81 years, row A). Extended parental leave duration then induces delayed return to work. About one in every nine women does not return to a job in a period of 36 months after birth (row B). However, those returning to a job within 36 months enjoy an increase in income per day on the order of 7 percentage points compared to the pre-birth income per day (row C). Moreover, women entering the labor market within 36 months after a long parental leave spell spend more than 3 months longer in that job than women entering a job after a short parental leave spell (row D).

Table 2

Does parental leave duration affect the fraction of women returning to the pre-birth employer? The treatment effect point estimate on returns to the same employer is positive but very small (2 percentage points) and of equal size as the standard error. Thus, returns to the pre-birth employer do not appear to be affected. On the other hand, those returning to the pre-birth employer after a prolonged parental leave spell enjoy a 3 percentage points higher in income per day; yet this effect is insignificant. Women returning to the pre-birth employer also enjoy an increase of 3.7 months in the duration of the job they accept (row G).

Does a reduction in the duration of parental leave deteriorate the labor market outcomes of mothers (column "1996 reduction")? The effects on take-up of parental leave and return to work within 36 months are exactly proportionately the reverse of the effects of the 1990 extension of parental leave. Women's take-up of parental leave decreases by about 5 months, and the percentage returning to work within 3 years after birth increases by almost 6 percentage points. Interestingly, however, there are no adverse effects on log income per day. It is even the case that women entering a job with 18 months of parental leave remain in that job about 1.7 months longer than women entering a job in a system with 24 months of parental leave duration. Reducing parental leave does not affect the fraction returning to the pre-birth employer. This is in line with the findings for the 1990 extension of parental leave. There are no significant effects of changes in parental leave duration on incomes per day nor on job duration of those returning to the pre-birth employer.[14]

An interesting conclusion emerges from studying the overall effects of changes in parental leave duration. Extending the duration from a low baseline of 12 months to 24 months appears to strengthen the labor market position of returning mothers. Reducing the duration of parental leave from a high baseline of 24 months by 6 months does not appear to harm the labor market opportunities of affected mothers.

The effects of changes in parental leave duration might interact in important ways with the pre-birth labor market situation of women and with the availability of publicly provided child care in the state. Table 3 therefore discusses heterogeneity of the effects of parental leave duration for women with short

[14]The point estimate on the effect of reduced parental leave duration on job duration is relatively large compared to the standard error failing standard levels of statistical significance only marginally.

tenure with the previous employer (less than 3 years) and for women whose pre-birth employer is based in a state that provides little child care.[15]

Table 3

The effects of an increase in the duration of parental leave by 12 months do not differ strongly from the overall effects in the low tenure and in the low child care subs-groups. An important exception is the effect of parental leave duration on post-birth job duration. Women with short pre-birth tenure enjoy an increase in post-birth tenure of 4.2 months – almost 1 month more than the average women in the treated group. Moreover, the effect of extended parental leave duration on post-birth job duration at the pre-birth employer is very similar for low tenure women. This suggests that women with low pre-birth job attachment are successful in locating more stable post-birth jobs with a new employer rather than their pre-birth employer.

In contrast, the effects of a decrease in parental leave duration appear to be more heterogeneous than the effects of an increase. In particular, women with low pre-birth job attachment are found to return to a job disproportionately more likely (7.4 percentage points rather than 5.8 percentage points) and they are also more likely to return to the pre-birth employer (5.9 percentage points compared to 1.7 percentage points). On the other hand, women in states with low availability of child care also tend to return to the pre-birth employer more likely and their job with the pre-birth employer lasts 3.8 months longer than with long parental leave duration.

But, at what point in time are the positive effects of extended and reduced parental leave duration realized? While Figures 5 and 10 suggest that there are important differences between treated and control groups conditioning on the time since birth, figures 6 and 11 suggest that these effects are merely a result of shifting the same decisions forward and backward in time. Are there any effects of changes in parental leave duration beyond these direct timing effects? This question can be addressed by estimating the effects relative to time since end of parental leave. Let TE_i indicate the time since exhaustion of parental leave. $Z_i = I(TE_i >= 0)$ then indicates whether the person enters the labor market after exhaustion ($Z_i = 1$) or before exhaustion ($Z_i = 0$). The following model was estimated

$$y_i = \beta_0 + \beta_1 D_i(1 - Z_i) + \beta_2 D_i Z_i + \sum_m \delta_m I(TE_i = m) + x_i'\gamma + \epsilon_i \tag{2}$$

The parameter β_1 captures the average effect of the change in parental leave duration before exhaustion, β_2 measures the average effect after exhaustion, δ_m capture the potentially highly non-linear change in the outcome as a function of time to exhaustion, and x_i is a list of control variables (including a linear time trend to account for secular calendar time trends).

Results in Table 4 indicate that extended parental leave leads to a slight but insignificant reduction in income per day for those women entering a job before using up all months of parental leave. Those women entering after using up all parental leave do not experience a significant change in income per

[15] We use a cutoff value of 3 years of tenure because this is the mean tenure prior to birth. We have also investigated the sensitivity of our results to splitting the sample at 2 years with no changes to the main result. Due to lack of access to child care figures at that time we proxy availability of child care using information on the year 2004. The states with little child care are Lower Austria, Upper Austria, Styria, and Tyrol.

day. The duration of the post-birth job is somewhat longer for women entering before exhausting parental leave. Again, the effects are not significantly different from zero.

Table 4

Interestingly, the 1996 reduction of parental leave also brings about a mixed impact on labor market outcomes. On one hand, women entering after the end of parental leave are found to earn about 6 percentage points more per day than they used to in the pre-birth job. There is no corresponding effect for women re-entering before the end of parental leave. On the other hand, the jobs taken by women before the end of parental leave last 3 months shorter with no corresponding effect on the jobs taken after the end of parental leave. Hence we conclude that the impact of shortening parental leave on subsequent careers do not point in a clear direction. Taken together, these results point toward a limited effect of changes in parental leave duration affecting the labor market position of women beyond the mechanical effect of changing the timing of child care and labor supply decisions.

9 Conclusions

In this paper, we exploit two major changes in Austrian family policies in the 1990 and in 1996 to analyze the causal effects of changes in parental leave provisions on mothers' subsequent labor market success. The 1990 policy change increased maximum PL duration by 12 months whereas the 1996 policy change reduced maximum PL duration by 6 months. Our analysis is based on a comparison of two groups that are well comparable. Mothers who gave birth to a child two months before and two months after the policy change. Such a comparison is powerful as, arguably, assignment to treatment is random in this sample.

We find that a longer duration of parental leave induces a significant delay in return to work for the average individual in our samples. We find the probability of being back at work 36 months after birth was almost 11 percentage points lower after the 12-months PL extension and roughly 6 percentage points smaller after the 6-months reduction of maximum PL duration.

A majority exhausted the full PL duration suggesting that maximum PL duration is a binding constraint for many mothers. We find that changes in maximum PL duration delays the return-to-work profile (re-employment probabilities since date of birth) by 12 months for mothers who fully exhaust their maximum PL duration. This is obviously so for women who return immediately after PL is exhausted but also hold for women with a spell of non-employment after PL exhaustion. In particular, we find almost no differences between treated and controls both in levels and changes of employment rates *after* the dates when maximum PL duration has run out, both for the 1990 and the 1996 policy change.

Finally, our results suggest that labor market outcomes upon re-employment after birth are strongly driven by selectivity in return-to-work behavior: the most productive women are re-entering the labor market first. In particular, we find that earnings losses of women re-entering the labor market before (and exactly at) exhaustion of PL duration have higher pre-birth earnings and lower earnings losses than women who return to the labor market after a spell of non-employment. The maximum duration of PL has surprisingly weak effects on labor market outcomes for women who take full advantage of

PL. For this group, post-birth earnings and post-birth job durations are not significantly different after the 1990 PL extension. However, we find that post-birth earnings are somewhat higher after the 1996 PL-reductions whereas we find no effect for post-birth job durations.

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Table 1:
Descriptive Statistics of mothers affected by the 1990 extension of parental leave duration

A. All mothers

	Before		After	
A1. Outcomes				
Parental leave take-up within 36 months after birth	1.006	(0.569)	1.800	(0.638)
Return-to-work within 36 monts after birth	0.603		0.501	
Return to same employer within 36 months after birth	0.638		0.665	
Change in log relative income per day*	-0.227	(0.492)	-0.161	(0.453)
Duration of post-birth job (months)*	19.259	(33.156)	22.812	(37.350)
Change in log relative income per day, same employer*	-0.144	(0.350)	-0.121	(0.322)
Duration of post-birth job (months), same employer*	19.381	(34.596)	23.471	(39.389)
** all jobs that started within 36 months after birth*				
A2. Pre-birth characteristics				
Age 15-19	0.099		0.091	
Age 20-24	0.432		0.411	
Age 25-29	0.341		0.350	
Age 30-34	0.098		0.112	
Age 35-44	0.030		0.037	
Tenure (years)	3.093	(3.262)	3.170	(3.383)
Pre-birth employment (years)	1.495	(0.547)	1.487	(0.552)
Pre-birth unemployment (years)	0.116	(0.266)	0.116	(0.266)
White collar occupation	0.580		0.575	
Wage (100 AS)	4.996	(2.169)	5.009	(2.148)
Number of Observations	6040		6599	

B. Weakly attached mothers (not re-employed before or immediately after PL exhaustion)

B1. Outcomes				
Parental leave take-up within 36 months after birth	0.977	(0.560)	1.868	(0.661)
Return-to-work, 64 months after PL exhaustion	0.626		0.592	
Return to same employer, 64 months after PL exhaustion	0.205		0.214	
Change in log relative income per day*	-0.421	(0.654)	-0.408	(0.674)
Duration of post-birth job (months)*	22.686	(0.657)	25.228	(33.945)
Change in log relative income per day, same employer*	-0.366	(0.508)	-0.363	(0.557)
Duration of post-birth job (months), same employer*	28.425	(39.056)	36.138	(41.175)
** all jobs that started within 64 months after PL exhaustion*				
B2. Pre-birth characteristics				
Age 15-19	0.108		0.093	
Age 20-24	0.454		0.432	
Age 25-29	0.315		0.328	
Age 30-34	0.096		0.109	
Age 35-44	0.028		0.037	
Tenure (years)	2.993	(3.172)	3.061	(3.264)
Pre-birth employment (years)	1.390	(0.610)	1.394	(0.608)
Pre-birth unemployment (years)	0.156	(0.308)	0.151	(0.302)
White collar occupation	0.519		0.519	
Wage (100 AS)	4.629	(1.937)	4.666	(1.931)
	3653		4096	

Notes: Relative income is income in year t divided by the median wage in year t. Pre-birth employment and unemployment is measured in two years prior to birth.

Source: Own calculations, based on ASSD

Table 2:
The Effects of Parental Leave Duration on Labor Market Outcomes

	1990 extension	1996 reduction
A. Parental leave take-up within 36 months after birth		
Treated	0.810	-0.394
	(0.020)***	(0.019)***
B. Return-to-work within 36 monts after birth		
Treated	-0.106	0.058
	(0.017)***	(0.017)***
*C. Change in log relative income per day**		
Treated	0.073	-0.001
	(0.021)***	(0.026)
*D. Duration of post birth job (months)**		
Treated	3.199	1.654
	(1.601)**	(0.959)*
E. Return to same employer within 36 months after birth		
Treated	0.020	0.017
	(0.021)	(0.019)
*F. Change in log relative income per day, same employer**		
Treated	0.032	0.014
	(0.019)	(0.025)
*G. Duration of post birth job (months), same employer**		
Treated	3.688	1.806
	(2.066)*	(1.206)

Notes: All regressions control for background characteristics and a two sided linear trend in time to policy change. * all jobs that started within 36 months.

Source: Own calculations, based on ASSD

Table 3:
Heterogeneity in the Effects of Parental Leave Duration on Labor Market Outcomes

	1990 extension			1996 reduction		
	All women	Low tenure	Low child care	All women	Low tenure	Low child care
A. Parental Leave take-up within 36 months after birth						
Treated	0.810	0.821	0.806	-0.394	-0.391	-0.405
	(0.020)***	(0.025)***	(0.029)***	(0.019)***	(0.026)***	(0.027)***
B. Return to work within 36 months after birth						
Treated	-0.106	-0.094	-0.106	0.058	0.074	0.050
	(0.017)***	(0.021)***	(0.025)***	(0.017)***	(0.022)***	(0.025)**
*C. Change in log relative income per day**						
Treated	0.073	0.073	0.074	-0.001	0.022	-0.001
	(0.021)***	(0.029)**	(0.032)**	(0.026)	(0.041)	(0.042)
*D. Duration of post birth job (months)**						
Treated	3.199	4.159	2.695	1.654	1.600	2.264
	(1.601)**	(1.754)**	(2.376)	(0.959)*	(1.170)	(1.453)
E. Return to same employer within 36 months after birth						
Treated	0.020	0.018	0.037	0.017	0.059	0.048
	(0.021)	(0.027)	(0.031)	(0.019)	(0.027)**	(0.030)
*F. Change in log relative income per day, same employer**						
Treated	0.032	0.022	0.037	0.014	0.014	-0.017
	(0.019)	(0.027)	(0.033)	(0.025)	(0.041)	(0.043)
*G. Duration of post birth job (months), same employer**						
Treated	3.688	3.197	2.362	1.806	1.995	3.813
	(2.066)*	(2.212)	(3.084)	(1.206)	(1.583)	(1.847)**

Notes: All regressions control for background characteristics and a two sided linear trend in time to policy change. Low tenure is tenure less than 3 years. Low child care is fewer than 10 % of all children under age 3 in child care in that state.

* all jobs that started within 36 months.

Source: Own calculations, based on ASSD

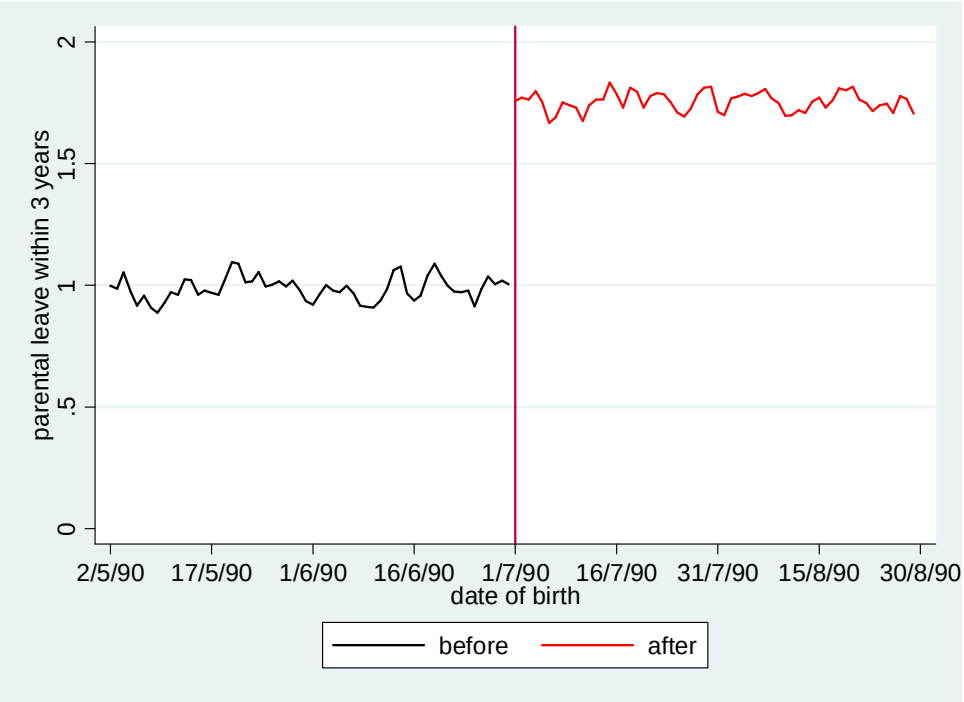
Table 4:
Effects before vs. After Exhaustion of Parental Leave

	Change in log relative income per day	Duration of post birth job (months)
	1990 extension	
Treated * before exhaustion	-0.042	5.966
	(0.058)	(3.929)
Treated * after exhaustion	-0.028	2.509
	(0.038)	(2.617)
Trend in time to exhaustion	Y	Y
Time trend	Y	Y
Control variables	Y	Y
Observations	7187	7193
R-squared	0.25	0.07
	1996 reduction	
Treated * before exhaustion	-0.012	-3.079
	(0.034)	(1.105)***
Treated * after exhaustion	0.067	0.437
	(0.017)***	(0.513)
Trend in time to exhaustion	Y	Y
Time trend	Y	Y
Control variables	Y	Y
Observations	7234	8701
R-squared	0.25	0.12

Notes: Parental leave exhausted after 12 months (before July 1990), 24 months (July 1990 to June 1996), and 18 months (after July 1996). Treated refers to mothers giving birth in the two months after the policy change.

Source: Own calculations, based on ASSD

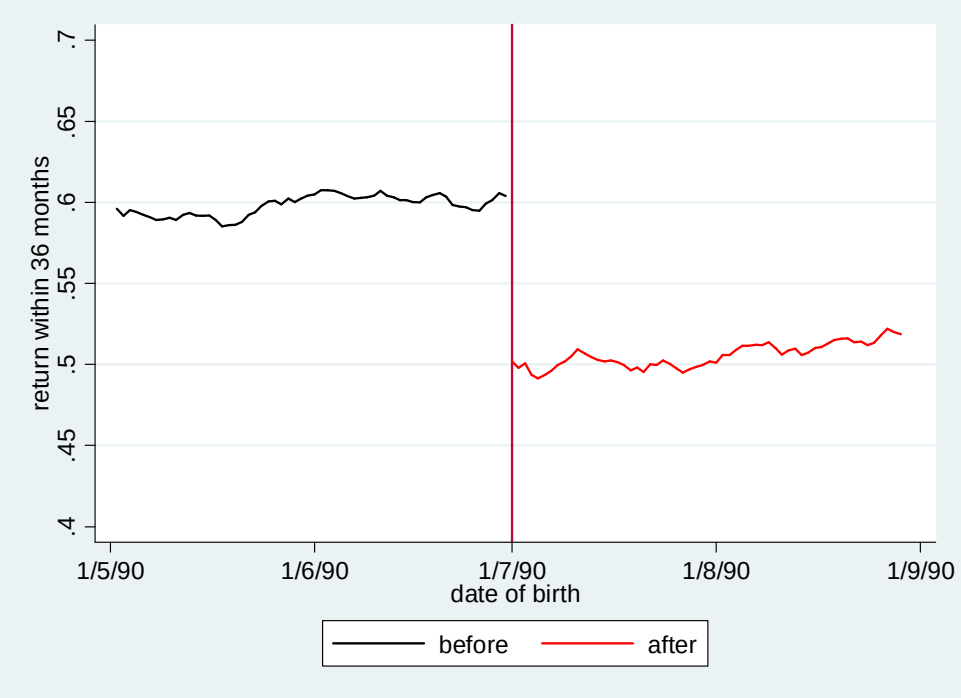
Figure 1:
Parental leave take-up (in years) within 36 months after birth, 1990 policy change



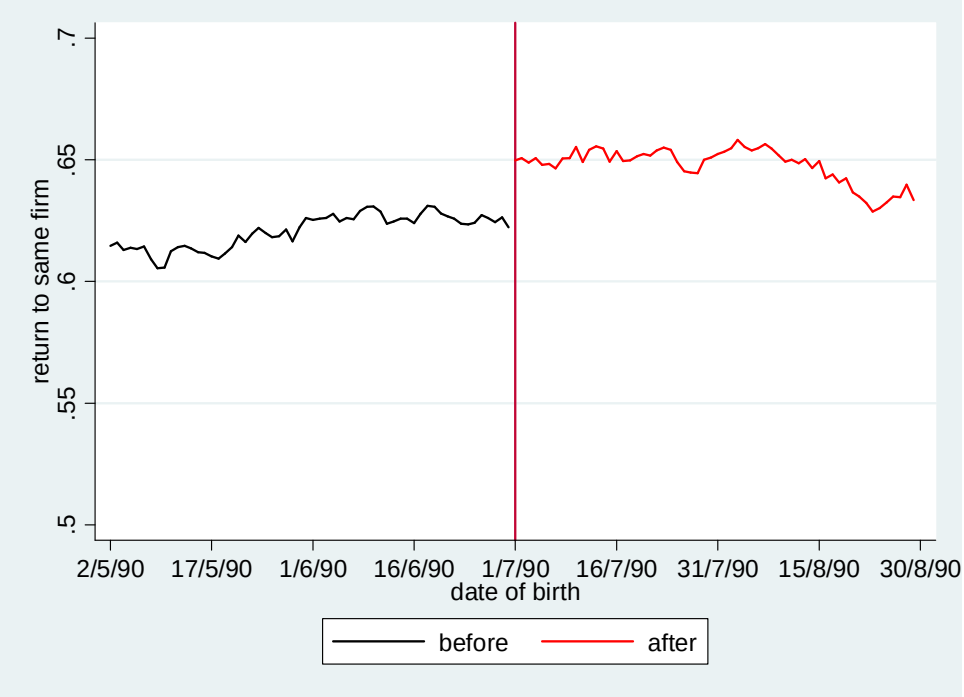
Source: Own calculations, based on ASSD

Figure 2:

A. Share returning to work within 36 months after birth

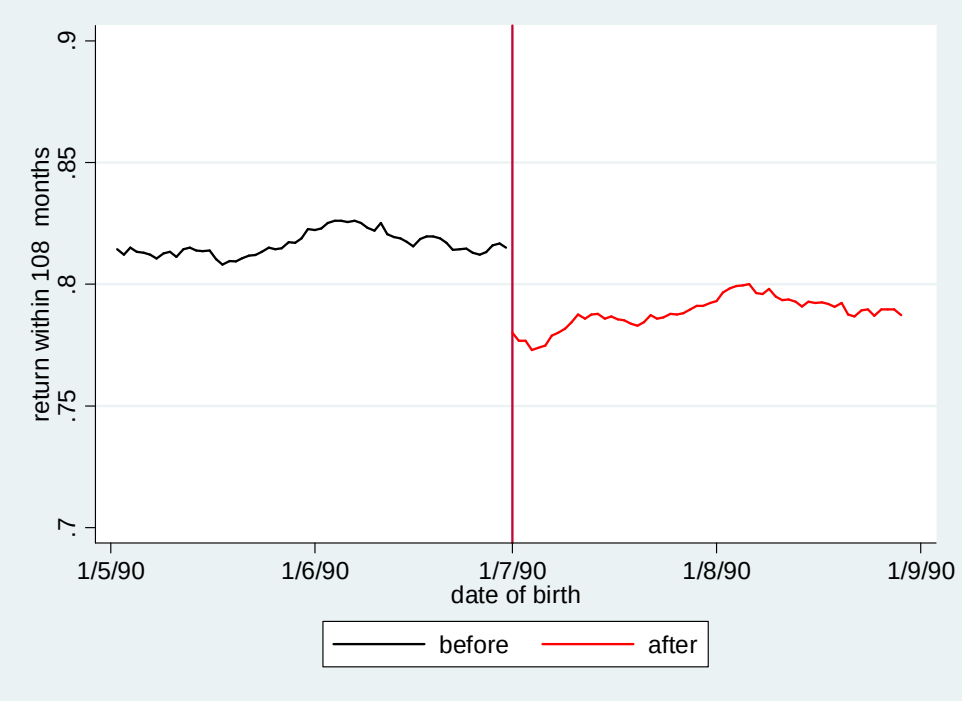


B. Share (among re-employed) returning to the same employer



Source: Own calculations, based on ASSD

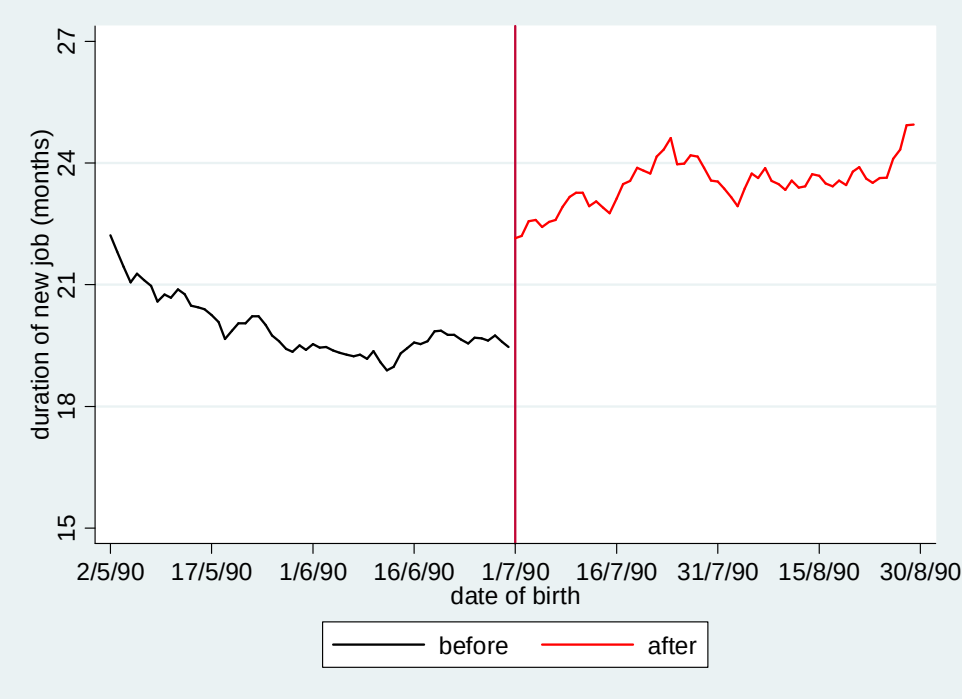
Figure 3:
Share returning to work within 108 months after birth



Source: Own calculations, based on ASSD

Figure 4:

A. Job durations, post-birth jobs started within 36 months after birth

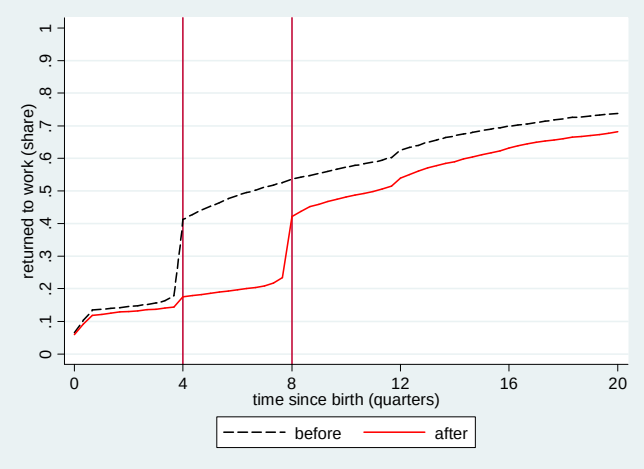


B. Change in log relative income, post-birth jobs started within 36 months after birth

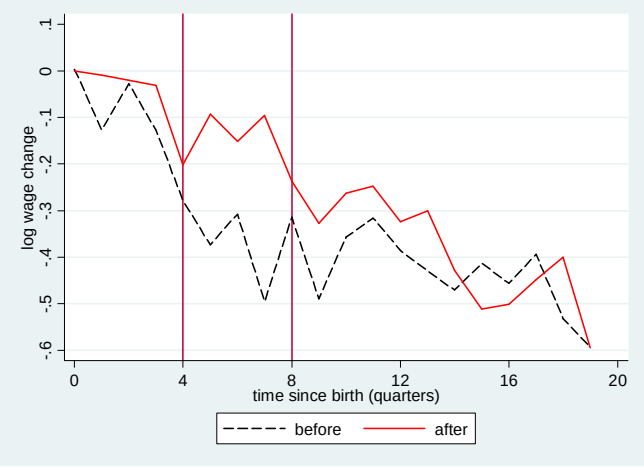
Source: Own calculations, based on ASSD

Figure 5:
Employment rates and job qualities, by time since birth

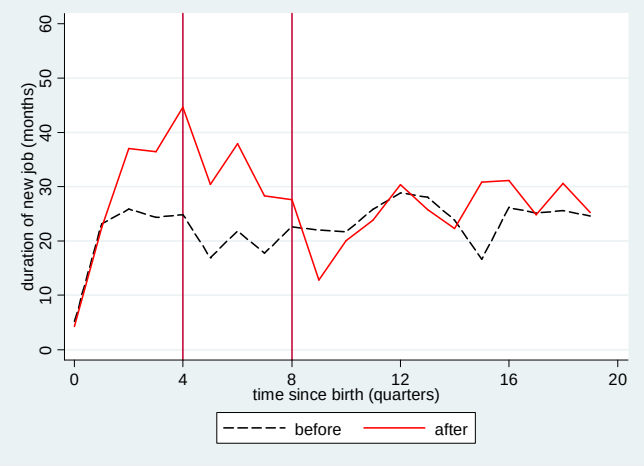
A. Share returned to work



B. Change in log relative income, jobs started during quarter t after birth



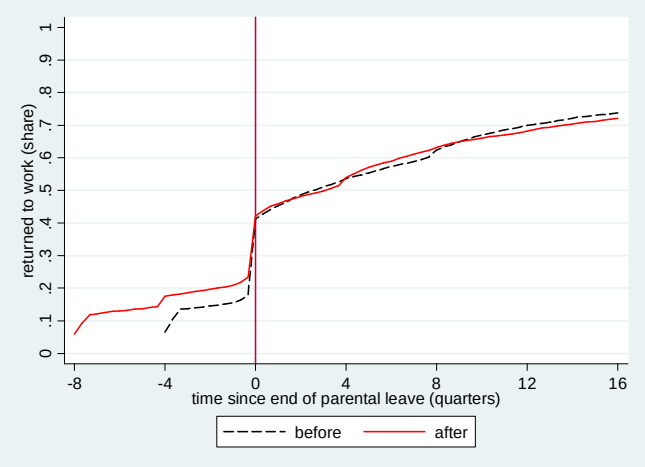
C. Duration of jobs (months) started during quarter t after birth



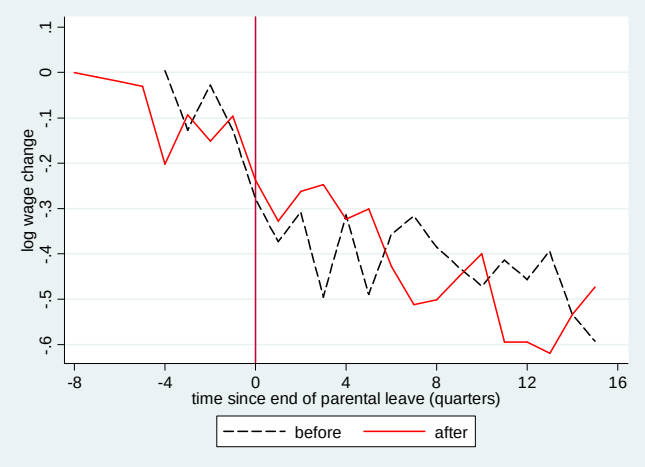
Source: Own calculations, based on ASSD

Figure 6:
Employment rates and job qualities, by time since PL exhaustion

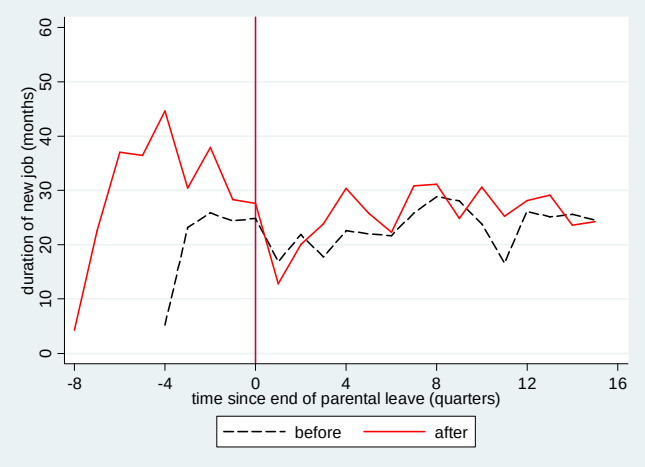
A. Percentage returned to work



B.Change in log relative income, jobs started during quarter t after PL exhaustion

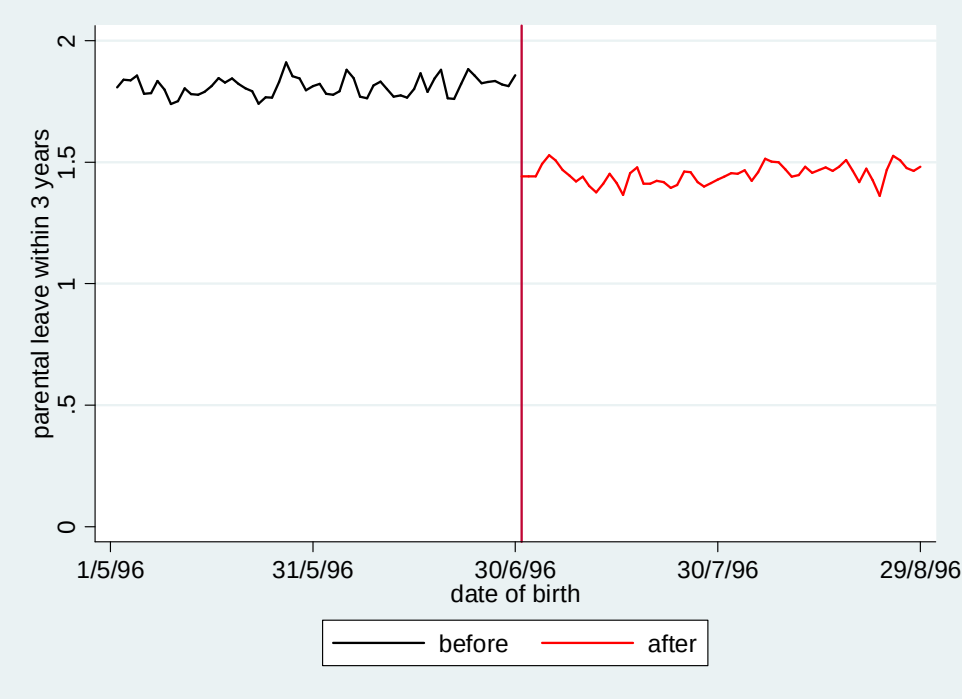


C. Duration of jobs (months) started during quarter t after PL exhaustion



Source: Own calculations, based on ASSD

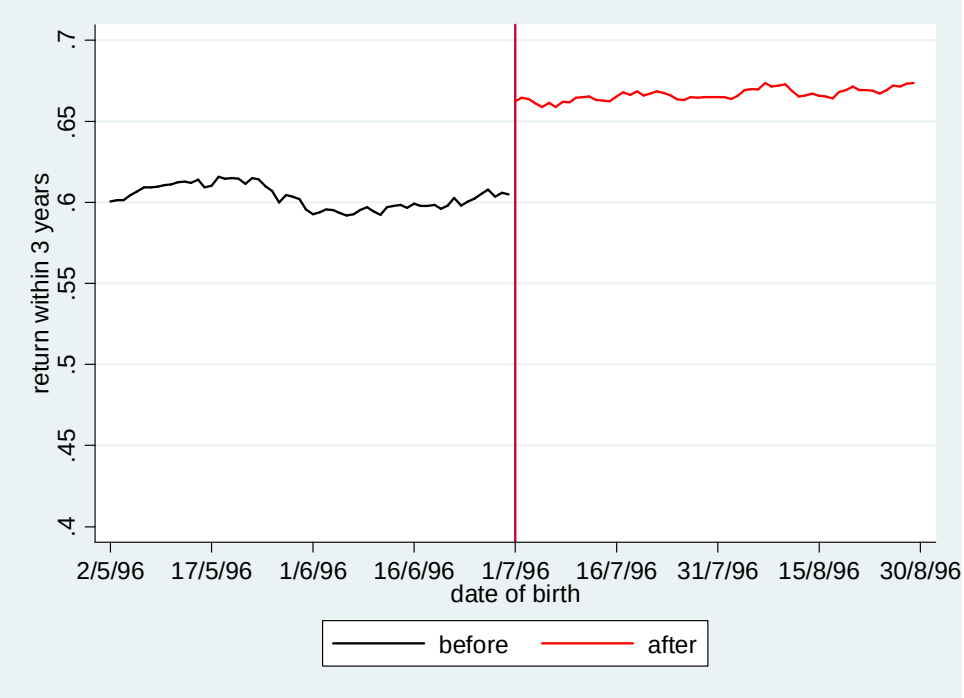
Figure 7:
Parental leave take-up (years) within 36 months after birth, 1996 policy change



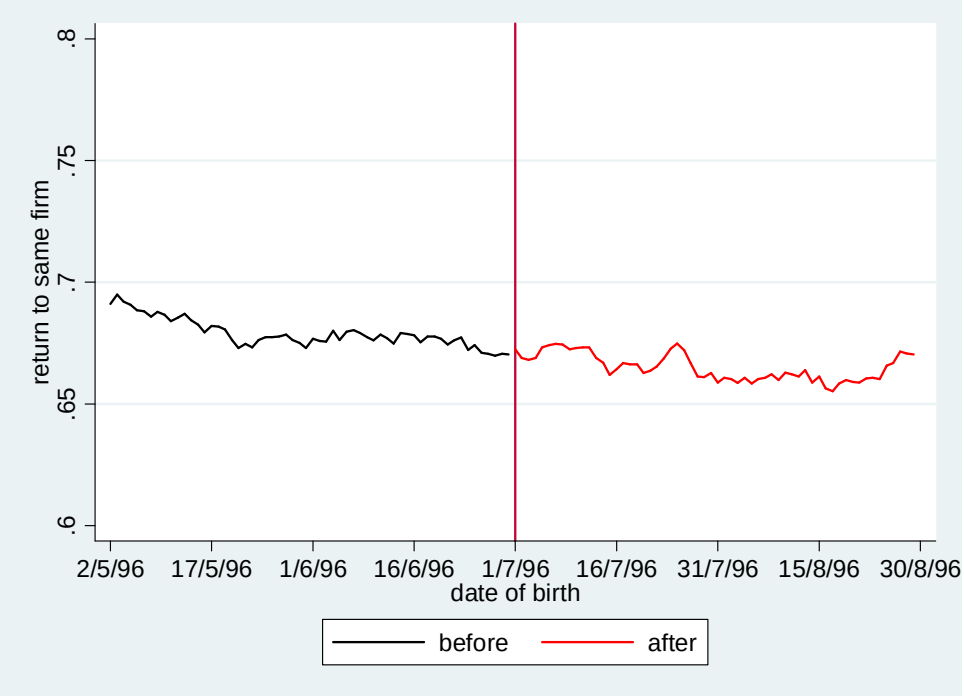
Source: Own calculations, based on ASSD

Figure 8:

A. Share returning to work within 36 months after birth



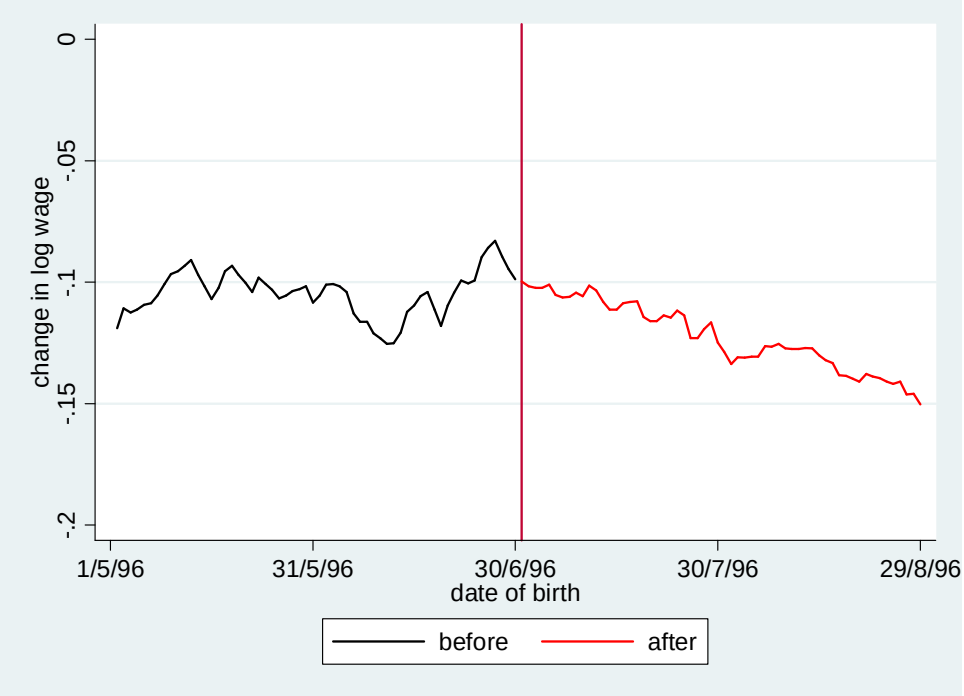
B. Share (among re-employed) returning to same employer



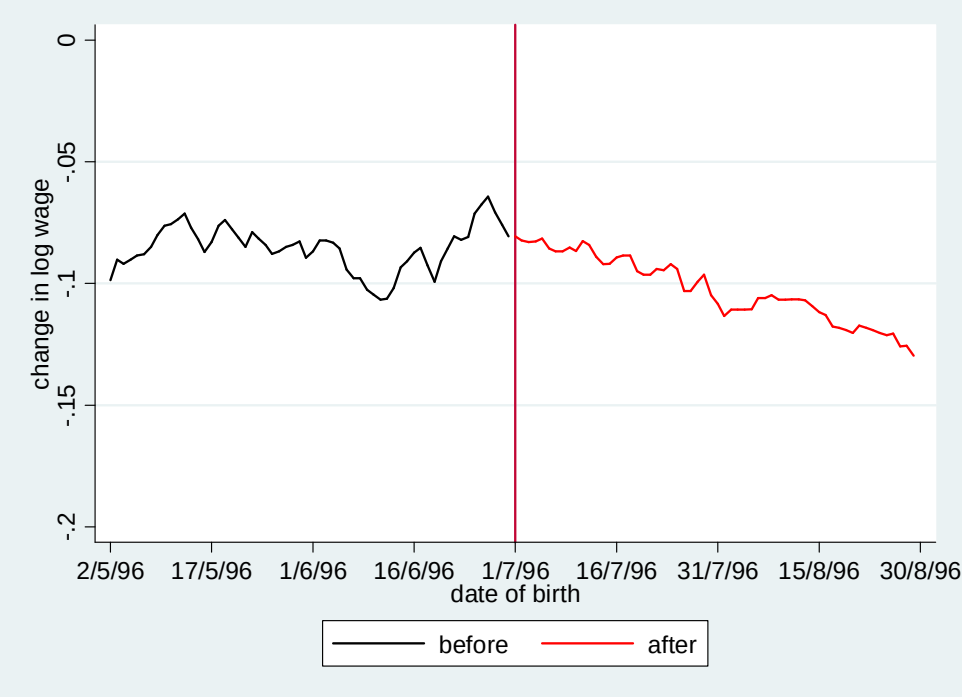
Source: Own calculations, based on ASSD

Figure 9:

A. Change in log relative income, post-birth job started within 36 months



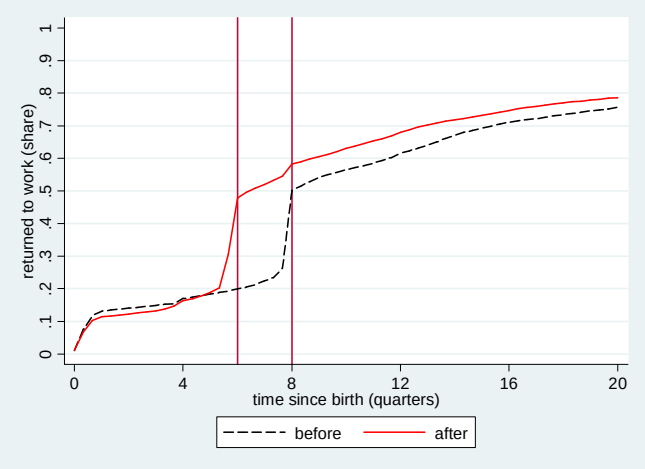
B. Job durations, post-birth jobs started within 36 months after birth



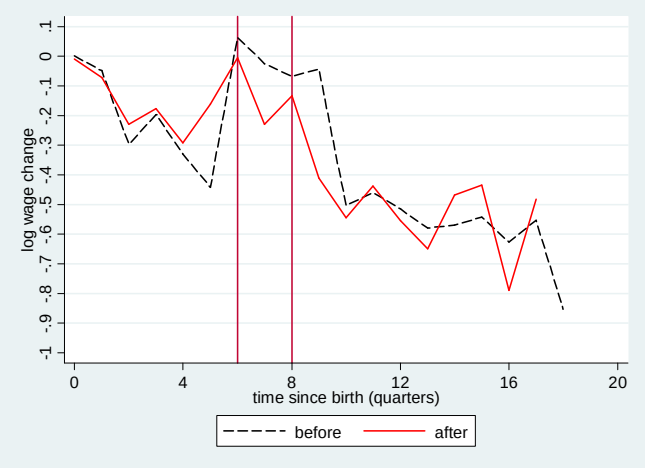
Source: Own calculations, based on ASSD

Figure 10:
Employment rates and job qualities, by time since birth

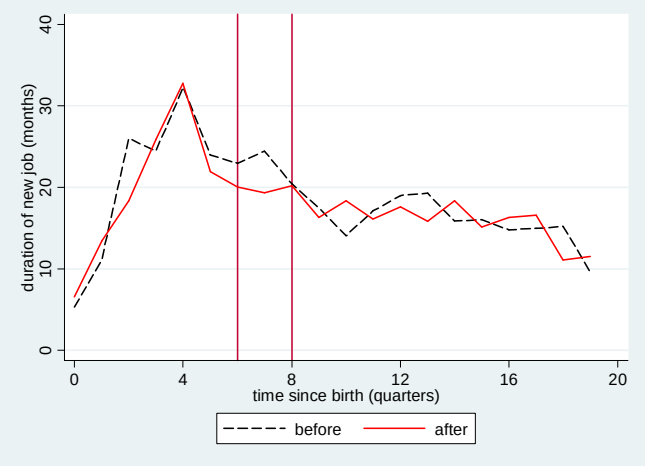
A. Percentage returned to work



B. Change in log relative income, jobs started during quarter t after birth



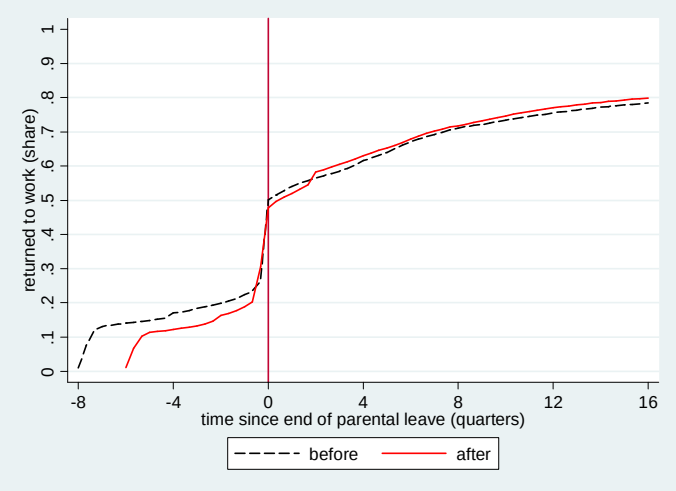
C. Duration of jobs started during quarter t after birth



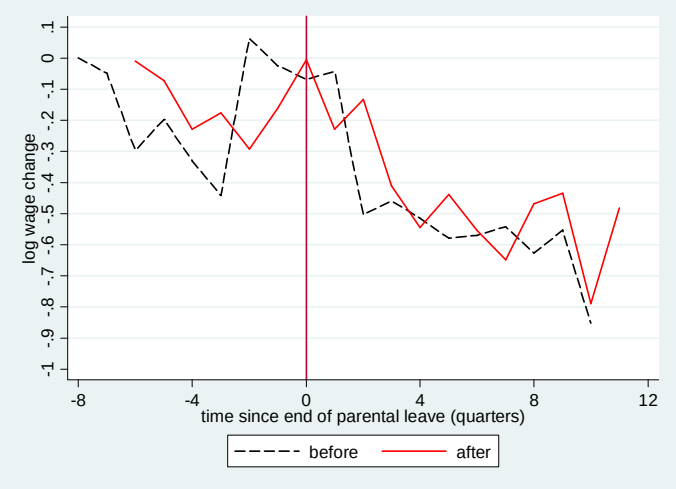
Source: Own calculations, based on ASSD

Figure 11:
Employment rates and job qualities, by time since PL exhaustion

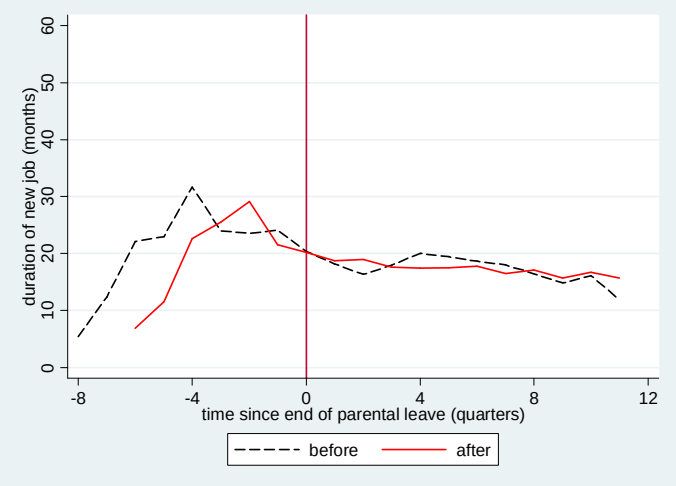
A. Percentage returned to work



B. CChange in log relative income, jobs started during quarter t after PL exhaustion



C. Duration of jobs started during quarter t after PL exhaustion



Source: Own calculations, based on ASSD

Table A1: Detailed results for Table 2 (1990 extension)

Outcome	Parental Leave	Return to Work	Log income Change	Duration of New Job	Return to Work (Same E.)	Log income Change (Same E.)	Duration of New Job (Same E.)
After 1990	0.810	-0.106	0.073	3.199	0.020	0.032	3.688
	(0.020)***	(0.017)***	(0.021)***	(1.601)**	(0.021)	(0.019)	(2.066)*
Days to policy change	0.000	0.000	-0.000	-0.001	-0.000	-0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.030)	(0.000)	(0.000)	(0.040)
After * days to policy change	-0.000	-0.000	-0.000	0.008	0.000	0.000	0.004
	(0.001)	(0.000)	(0.001)	(0.046)	(0.001)	(0.001)	(0.060)
Age 20-24	0.044	-0.091	-0.190	6.008	-0.041	-0.141	8.437
	(0.018)**	(0.016)***	(0.019)***	(1.144)***	(0.021)*	(0.019)***	(1.579)***
Age 25-29	-0.012	-0.096	-0.181	6.305	0.048	-0.124	8.344
	(0.019)	(0.017)***	(0.021)***	(1.375)***	(0.022)**	(0.020)***	(1.841)***
Age 30-34	-0.115	-0.125	-0.124	10.412	0.096	-0.103	13.244
	(0.024)***	(0.021)***	(0.026)***	(1.996)***	(0.027)***	(0.024)***	(2.547)***
Age 35-44	-0.240	-0.102	-0.075	16.195	0.115	-0.067	17.442
	(0.032)***	(0.028)***	(0.033)**	(3.371)***	(0.036)***	(0.029)**	(3.833)***
Tenure (years)	-0.002	-0.014	-0.010	1.603	-0.003	-0.005	1.789
	(0.002)	(0.001)***	(0.002)***	(0.168)***	(0.002)**	(0.002)***	(0.201)***
Employed (years)	0.445	0.208	-0.076	1.454	0.135	-0.025	2.567
	(0.014)***	(0.009)***	(0.017)***	(1.039)	(0.016)***	(0.015)*	(1.551)*
Unemployed (years)	0.480	-0.056	-0.073	-3.035	-0.327	-0.069	-2.473
	(0.022)***	(0.018)***	(0.030)**	(1.771)*	(0.029)***	(0.036)*	(3.076)
White collar	-0.040	0.071	0.022	-0.035	0.014	-0.023	-0.580
	(0.013)***	(0.011)***	(0.015)	(1.127)	(0.015)	(0.013)*	(1.517)
Income per day (Nominal 100 AS)	-0.007	0.020	-0.050	0.376	0.014	-0.022	0.434
	(0.003)**	(0.002)***	(0.003)***	(0.244)	(0.003)***	(0.003)***	(0.308)
Region effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.295	0.349	0.456	0.924	0.466	0.249	-4.864
	(0.035)***	(0.027)***	(0.040)***	(2.546)	(0.038)***	(0.035)***	(3.524)
Observations	12639	12639	6943	6951	6951	4519	4524
R-squared	0.43	0.11	0.17	0.08	0.17	0.13	0.10

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%