Maternity Leave Legislation, Female Labor Supply, and the Family Wage Gap

-preliminary and incomplete-

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Abstract

This paper analyzes the impact of an expansion of maternity leave on labor market outcomes of women with children. The focus is on Germany, a country that underwent several changes in maternity leave legislation since the late 70s. We identify the causal impact of an expansion in maternity leave by comparing labor market outcomes of women who gave birth shortly (i.e. one month) before and after a change in maternity leave legislation. There is strong evidence that each expansion induced women to delay their return to work. The expansions had little impact on women's labor supply in the long-run, neither at the extensive nor at the intensive margin. However, they reduced women's earnings, even 8 years after childbirth.

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1 Introduction

With the growing employment rate of mothers with young children, many countries now provide various types of maternity leave policies. A typical policy allows mothers (and sometimes fathers) to leave their workplace for a limited time around childbirth, and give them the right to return to their job afterwards. The period of maternity leave varies substantially from country to country. In the US, it was only in 1993, when the Family and Medical Leave Act (FMLA) was approved, that a federal maternity leave policy came into effect. This act requires companies with more than 50 employees to supply 12 weeks of parental leave. In Germany, in contrast, similar coverage has been available to women since 1968. The maternity leave period has been increased several times since the late 70s. Currently women are entitled to 3 years of (partly paid) maternity leave.

This paper analyzes the impact of the expansions in maternity leave coverage in Germany on women's labor market outcomes after childbirth. We begin with women's decision when to return to work after childbirth: Do women delay their return to work when they are entitled to a longer maternity leave period? We then turn to the long-term impact of maternity leave legislation on labor supply: Does an expansion in maternity leave eventually bring more or less women back to work? We also analyze the impact of an expansion in maternity leave on full-time versus part-time work. From a theoretical point of view, it is ambiguous whether a more generous leave policy increases or decreases labor supply in the long-run. One argument for why an extension in job-protected leave increases women's participation rates in the long-run is the following. Suppose a mother prefers not to return to her *pre-birth employer* T_1 periods after childbirth, but would return T_2 periods after childbirth. This woman works T_2 periods after childbirth when she is entitled to T_2 periods of leave, but not necessarily when she is entitled to only T_1 periods of leave and does not the option to return to her previous employer at T_2. This is because she may not have found a job she likes as much as her previous job. On the other hand, there are arguments why an extension in job-protected leave may reduce labour supply in the long-run. First, a delay in the return to work may decrease women's value of labor market skills, which in turn may increase the probability that a woman drops out of the labor market, or that she works part-time if she returns to the labor market. Second, more time at home may increase the mother's preferences for remaining at home with her children - which again might reduce the probability that she will return to the labor market.

Finally, we analyze the impact of an expansion in maternity leave on women's earnings after childbirth. There are several channels through which maternity leave legislation may affect earnings. The most important one is probably through human capital accumulation. If an expansion in maternity leave induces women to postpone their return to work, then they have less time to accumulate human capital in the labor market, and may lose more labor market skills while at

home. Second, the maternity leave policy may affect the probability that a woman returns to her previous employer or occupation after childbirth, and thus affect the probability that she retains her firm- or occupation-specific human capital. Third, an expansion in maternity leave may have an impact on the type of women who return to work, thus affecting earnings through selection.

We identify the causal impact of an expansion in maternity leave on labor market outcomes after childbirth by comparing labor market outcomes of women who give birth shortly before and shortly after the change in legislation. For instance, the first policy reform occurred in May 1979 when maternity leave was increased from 2 to 6 months. For this change, we compare women who gave birth in April 1979 and were entitled to 2 months of leave with women who gave birth in May 1979 and were entitled to 6 months of leave. Our identifying assumption is that it is random whether a mother gives birth in April or in May. Later, we provide evidence that this is likely to be the case.

Our main data comes from Social Security Records (BLH – Beschäftigten-Leistungsempfänger-Historik), provided by the *Institut fuer Arbeitsmarkt- und Berufsforschung* in Nuremberg. The data allows us to construct the complete work history -including time spent in unemployment and on leave of absence- for *every* woman covered by the social security system, for the years 1975 to 2001. A major advantage of our data is its large sample size - which is necessary for our identification strategy. In our final sample, there are at least 20000 women who go on maternity leave each month. A further advantage of our data is that, due to its administrative nature, employment and wages are measured very precisely. The main disadvantage is that it does not contain direct information on children; we only observe whether a mother takes maternity leave. Later, we describe in detail how we deal with this problem.

Our main findings can be summarized as follows. First, we find strong evidence that each expansion in job-protected leave induced women to delay their return to work. This effect is strongest for the first expansion from 2 to 6 months, and weakest for the last expansion from 18 to 36 months. Second, we find no evidence that the expansions affected women's labor supply in the long-run, neither at the intensive nor at the extensive margin. That is, 3 years after childbirth or later, labor force participation rates as well as full-time work, conditional on participating in the labor market, are similar before and after the reform. One possible interpretation of this result is that the effects the effects that predict an increase or decrease in labor supply are both at work, and roughly offset each other. Third, the expansions in job-protected leave, in particular the increase from 6 to 10 months, lead to a decrease in women's earnings, even 8 years after childbirth. This indicates that more time spent at home have long-lasting negative effects on women's career prospects after childbirth.

Our paper also contributes to the literature on the so-called 'family wage gap'. This literature

attempts to estimate the causal impact of children - and career interruptions due to childbirth - on women's wages. In the case of Germany, several studies find that career interruptions due to childbirth substantially reduce women's earnings. For instance, according to Kunze and Ejrnaes (2004), one year out of work after child birth is associated with a wage loss of 12 %. These studies use a first-difference approach, and compare women's wages before and after childbirth. While interesting, they face an important problem: Women who return to work earlier after child birth are likely to differ from women who return later. First differencing may not be enough to deal with this unobserved heterogeneity. This paper uses exogenous variation in time out of the labor market induced by changes in maternity leave legislation to get more reliable estimates for the impact of career interruptions on subsequent earnings. Our results indicate that the impact of time spent at home after childbirth on future wages is *causal*.

The structure of the paper is as follows. Section 2 briefly discusses the relevant literature. Section 3 highlights the main features of the German maternity leave system. We then describe the data (Section 4), and outline our empirical strategy (Section 5). Section 6 reports results, and Section 7 concludes.

2 Literature Review

We first review the literature on the so-called 'family wage gap' - i.e. the differential in pay between women with and without children . We then turn to papers that evaluate the impact of maternity leave on mothers' labor supply and wages.

The family wage gap It is often argued that much of the wage differential between men and women is due to the fact that women bear children and have the primary responsibility for caring or arranging care for them. A first glance at the data indeed shows that in many countries, the 'child penalty' is large. For the US, Waldfogel (1998) finds a family wage gap of 20 %; mothers at age 30 earn 70 % of men's pay, while childless women earn 90 %[1]. The family wage gap is of similar magnitude in the UK (e.g. Waldfogel 1998)[2] and Canada (e.g. Phipps et al. 2002). In Scandinavian countries, in contrast, the family gap appears to be much smaller[3]. Most studies agree that the loss in work experience and the concentration in part-time jobs play an important role in explaining the family wage gap.

[1] Anderson et al. (2002) confirm the strong impact of children on women's wages. They show that the child penalty is particularly strong for highly educated women.

[2] Using different data, Joshi (1991) and Joshi, Paci, and Waldfogel (1999) report a somewhat higher number for the UK: Women with children earn 33 % less than childless women.

[3] See e.g. Datta Gupta and Smith (2002) for Denmark and Albrecht et al. (1999) for Sweden.

Do mothers merely accumulate less human capital than childless women, or do they lose labor market skills while taking care for their children? Using Swedish data, Albrecht et al. (1999) directly estimate the impact of career interruptions on subsequent earnings. They distinguish between several types of career interruptions. All types are found to have a negative impact on earnings. Interruptions due to unemployment, however, result in larger wage losses than interruptions due to maternity leave and child care. Kunze (2002) repeats the analysis for young women in (West) Germany. She confirms the strong negative impact of career interruptions on earnings. However, unlike Albrecht et al. (1999), she finds that interruptions due to child birth cause a greater wage loss than interruptions due to unemployment. Using more detailed data than Kunze (2002), Beblo and Wolf (2002) report similar results. Kunze and Ejrnaes (2004) study the evolution of women's wages around the birth of their first child in more detail. Women who completed an apprenticeship -the biggest education group in Germany-, earn on average 33 % less after childbirth than before child birth. Women who return to work full-time, to the same employer and to the same 3-digit occupation still experience a wage loss of 25 %. One year out of work after child birth is associated with a wage loss of 12 %. Wage losses for the unskilled and highly skilled are lower, but still substantial.

While these studies are interesting, they face an obvious problem: Women who return to work earlier after child birth are likely to differ from women who return later. First differencing may not be enough to deal with this unobserved heterogeneity[4]. This paper uses exogenous variation in time out of work induced by changes in maternity leave legislation to get a more reliable estimate for the impact of career interruptions on subsequent earnings. We first estimate the impact of maternity leave legislation on the labor supply of mothers. We find strong evidence that women postpone their return to work when maternity leave is longer. We then turn to the impact of maternity leave legislation -and thus career interruptions- on wages. Next, we review the literature on the effects of maternity leave on women's labor market outcomes.

The impact of maternity leave on labor supply and wages There are several papers that study the impact of job-protected leave on women's labor market outcomes. Ruhm (1998) analyzes labor market consequences of rights to paternity leave for nine European countries over the 1969 through 1993 period. His analysis is based on aggregate data from the OECD. He focuses on employment-to-population ratios and hourly wages. No distinction is made between women with and without children. Ruhm's results suggest that maternity leave legislation rises women's employment ratios, but has no impact on their earnings[5]. The study leaves open the channels

[4] For this reason, Kunze and Ejraenes (2004) instrument for the time women spend at home. Their main instruments are regional unemployment rates as well as changes in parental leave policies.

[5] In a related study, Ruhm and Teague (1997) find that amployment-to-population ratios are higher in countries mandating short or intermediate duartions of leave. Longer durations of leave, in contrast, may lower employment-

through which maternity leave legislation operates. Do more generous maternity leave mandates increase the employment ratio because childless mothers are more likely to work in order to qualify for maternity benefits? Or do more generous leave mandates increase the labor supply of women with children?

For the US, several studies use state-wide variation in maternity leave legislation or the variation induced by the Family and Medical Leave Act (FMLA) in order to analyze the impact of maternity leave legislation on employment and wages for women with children. Waldfogel (1999) exploits variation induced by the FMLA only. She finds that the FMLA had a small and positive, but insignificant, impact on the employment of mothers. Klerman and Leibowitz (1997) only exploit state-wide variation in maternity leave legislation. Using data from the 1980 and 1990 census, they also find that these policies had little impact on mothers' employment status. Baum (2003a) uses both sources of variation. Moreover, unlike the other two studies, his analysis is based on longitudinal data from the NLSY, allowing him to distinguish between the short- and long-run effects of maternity leave legislation on labor supply. He finds suggestive evidence that maternity leave legislation induces women to postpone their return to work, but eventually brings more women back to work. These results are in line with Berger and Waldfogel (2004) who find that women in jobs that provided leave coverage are more likely to take a leave of up to 12 weeks, but return more quickly after 12 weeks. There is also some evidence that the FMLA increased job retention after child birth (Baum 2003a, Waldfogel et al. (1999)).

Baker and Milligan (2004) and Hanratty and Trzcinski (2005) evaluate maternity leave policies in Canada. Baker and Milligan (2004) exploit differences in maternity leave legislation across Canadian provinces. They find that longer mandates increase the time women spend at home with their infants, and increase job continuity over the birth event. No such effects are found for modest mandates[6]. Hanratty and Trzcinski (2005) focus on the impact of the expansion in the duration of paid maternity benefits from 20 to 50 weeks in 2000 on the post-birth employment patterns of young women. They find strong short-term effects of the expansion: Women returned to work later after the expansion. However, there is little evidence that the reform had a long-term effect on women's labor supply: The proportion of women working one year after child birth is similar before and after the reform.

Ondrich et al. (2003) use the German Socioeconomic Panel to evaluate the changes in maternity leave law that took place in Germany after 1986. Their results suggest that longer mandates reduce employment of mothers[7].

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to-population ratios.

[6] In a second step, Baker and Milligan (2004) analyze the impact of maternity leave legislation on infant's health. Their results indicate that the mandates had no impact on infant's health, as measured by infant mortality rates and the incidence of low birth weight.

[7] Using aggregated time series data from the German Mikrozensus, Merz (2004) finds that the employment-

Only few papers analyze the impact of maternity leave mandates on wages for returning mothers. Both Baum (2003b) and Waldfogel (1999) find that in the US, the FMLA had no significant effect on women's wages. For Germany, in contrast, Ondrich et al. (2003b) report that the increases in the duration of maternity leave led to lower wage growth for returning mothers. Waldfogel (1997, 1998) examines the effect of maternity leave coverage provided by *employers,* as opposed to coverage mandated by the *government.* She finds that women who are covered by maternity leave and returned to work after childbirth earned up to 20 % higher wages than those who are not. She concludes that maternity leave policies might be successful at alleviating some of the adverse effects children have on wages. However, Hashimoto et al. (2004) argue that these large gains are mostly due to the selection of women with a high earnings potential into jobs that provide coverage.

This paper improves on the existing literature in several respects. Most importantly, we identify the causal impact of maternity leave mandates on mother's labor market outcomes in a more convincing way than previous studies. Our sample size is large enough to compare women who give birth just before and just after the law changed. Consider for instance the increase in job-protected leave from 2 to 6 months that took place in May 1979. Here, our estimation strategy amounts to comparing women who give birth in April and are subject to 2 months of job-protected leave with women who give birth in May and are subject to 6 months of job-protected leave. Our identifying assumption is that it is random whether women give birth in April or in May.

There are two recent papers that use a similar methodology to evaluate changes in maternity leave legislation in Austria and Sweden, respectively. Ekberg et al. (2005) analyze the impact of the Swedish "Daddy-Month-Reform", a reform that allocated one month of parental leave to fathers. Their results indicate that the reform increased fathers' leave taking, but had no long-term effect on father's involvement in care for sick children. Lalive and Zwiemüller (2005) study the impact of the expansion in paternity leave provision from one to two years that took place in Austria in 1990. They focus on mothers' return to work and fertility decisions. They find that the expansion induced mothers to delay their return to work, and to "bunch" planned births. Neither paper analyzes the impact of expansions in maternity leave mandates on wages - which is the main focus of this paper.

The next section describes maternity leave legislation in Germany.

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to-population ratio of married women with young children has steadily increased, while their hours worked has decreased since the 80s. Merz attributes some of these changes to the changes in maternity leave legislation.

3 Maternity leave legislation in Germany

In Germany, maternity leave legislation consists of three parts, maternity protection, protected maternity leave, and maternity benefits. We discuss each part in turn.

Maternity protection Maternity protection refers to the first 6 weeks before and 8 weeks after birth. Before 1979, mothers were allowed to work during this period if they wanted to. Since 1979, mothers *must not* work during the maternity protection period.

Protected maternity leave Protected leave implies that mothers have the right to return to a job that is *comparable* to the job they held before child birth. In other words, firms must keep a comparable, but not the same, job available during the protected maternity leave period, and are not allowed to dismiss women during this period. There is no wage guarantee. Firms are allowed to pay returning mothers a lower wage than they used to earn, even if mothers work the same number of hours as before birth[8]. The duration of protected maternity leave has been subsequently extended since the late 70s. Before 1979, there was no protected maternity leave in addition to the 8 weeks of mother protection after child birth. Since 1992 women are entitled to a total of 3 years of protected leave. Table 1 summarizes the duration of protected leave in different years.

Table 1: Maternity leave legislation in Germany

children born since	mother protection	protected leave	benefits: max. duration
... 1.1.1965	2	0	0
... 1.4.1979	2	4	6
... 1.1.1986	2	8	10
... 1.1.1988	2	10	12
... 1.7.1989	2	13	15
... 1.7.1990	2	16	18
... 1.1.1992	2	34	18

Between 1979 and 1986, maternity benefits were available only to working mothers, depended on womens' income before child birth, and were equal to up to 750 DM per month. Since 1986, maternity benefits are available to all women and are equal to 600 DM per month during the first 6 months after child birth, independently of womens' income. From the 7th month onwards, maternity benefits are means-tested.

[8] Note, however, that the majority of workers in Germany (about 75 %) are covered by collective bargaining agreements. Firms that recognize unions have to pay at least the union wage to its workers. This restricts firms by how much they can reduce wages of returning mothers.

Before 1986, only mothers had the right to go on leave. Since 1986 both mothers and fathers are eligible for job-protected leave. However, the proportion of fathers who take parental leave is very small; in 2001 it was 1.6 % (Engstler and Menning (2003)). This paper therefore analyzes the impact of maternity leave legislation on mothers only.

Since 1986, protected paternal leave is compatible with part-time work. Between 1986 and 1988, mothers (or fathers) were allowed to work up to 15 hours per week during job-protected leave, without losing the right to work for their pre-birth employer. Since 1989, women are allowed to work up to 19 hours per week.

Maternity benefits The third part of maternity leave legislation refers to maternity benefits. Payment during the maternity protection period, i.e. 6 weeks before and 8 weeks after child birth, has not changed since the late 60s. During this period women are entitled to payment equivalent to their average income during the last three months prior to child birth. Costs are shared between the public health insurance, the federal government, and the employer. The federal government contributes 400 DM as a one time payment per child. The health insurance pays 25 DM per calender day, or about 750 DM per month. The additional costs are borne by the employer[9].

The duration mothers are entitled to maternity benefits has been increased in tandem with the duration of job-protected leave. From 1979 to 1986, when the maternity leave period in addition to the maternity protection period was four months, mothers were entitled to maternity benefits for a total of six months. Payment during the maternity leave period was equivalent to sick pay, and up to 750 DM per month[10]. Costs were borne entirely by the federal government, and not by employers. Only women who were employed before child birth were entitled to maternity benefits.

Since 1986, all mothers receive maternity benefits for at least six months, regardless of their employment status before birth. Benefits during the maternity leave period are equal to 600 DM. From the seventh month onwards, maternity benefits are means-tested, and depend on the annual net family income two years before child birth. It is reduced on a sliding scale basis. The maximum duration women are entitled to maternity benefits is listed in table 1. Benefits are paid by the federal government. In 1987, 83.6 % of West German women received maternity benefits for more than six months. Since the income limits have not been increased since 1986, proportions are somewhat lower in later years (Engstler and Menning (2003)). Some West-German states pay maternity benefits in addition to the federal benefits[11].

[9] Firms with less than 20 employees are exempt from paying maternity benefits. In this case, the additional costs are borne by the federal government.

[10] It was reduced to 510 DM per child and month in 1984.

[11] The West-German states who pay additional maternity benefits are Bayern, Baden-Württemberg, and Rheinland-Pfalz. See Rosenschon (2001) for details.

4 Data

Our main data comes from Social Security Records (BLH – Beschäftigten-Leistungsempfänger-Historik). The data allows us to construct the complete work history -including time spent in unemployment and on leave of absence- for *every* man and woman covered by the social security system. Not included in the data are civil servants and the self employed. So-called marginal jobs that are exempt from social security contributions, i.e. jobs with at most 15 hours per week or temporary jobs that last no longer than 6 weeks, are included in the data only from 1999 onwards. Altogether, the data represents about 80 % of the German work force. Unlike many other administrative data sets, our data contains an unusually rich set of background information for the individual, including age, education, gender, nationality, occupation, job position, etc.

An important advantage of our data is its huge sample size; in our final sample, there are about 20000 women who go on maternity leave each month. This is crucial for our estimation strategy which relies on comparing women who gave birth just before and just after a change in maternity leave legislation. Another advantage is that, due to the administrative nature of the data, employment and wages are measured very precisely.

However, the data is not without limitations. There are three main problems. First, our data does not contain direct information on children. We only observe whether and when a woman goes on leave. We thus have to infer the birth month of the child from the month the mother goes on leave. Hence, the child's birth month is likely to be measured with error. For women who give birth around the change in law, we may thus not know for sure which law applies. Second, in our data not all leave taking may be due to maternity leave. Alternative reasons include military service, illness, disability, and early retirement. Our sample may thus include some women who are on leave but have not given birth. Third, we do not observe the number of hours a woman works, but only observe whether a woman works full-time (more than 30 hours) or part-time (less than 30 hours). A reduction in the woman's wage after child birth may thus either be due to a reduction in the hourly wage, or due to a reduction in the number of hours worked.

We use two additional data sources, the German Microcensus and data from the German Pension Register, to address each of these problems. The German Pension Register is a 1 % random sample drawn from our data base, supplemented with precise information on when a woman has given birth. The data is principally available from 1975 to 1995. However, reliable data on fertility exists only from 1986 onwards. We use this data source to analyze how many leave spells are due to child birth, and how the month a woman goes on maternity leave is related to the month she gives birth.

The German micro census is a survey of 1 % randomly selected households. Although the survey has been conducted since 1969 on an annual basis, it is publicly available only for the years

1989, 1991, and 1993 to 2002. We use this data to analyze how the number of children affects the number of hours worked, separately for women working full-time or part-time. Details on the sample selection for each data set and variable definitions can be found in Appendix A and B.

How many leave spells are due to child birth? One problem of our data is that not all leave spells are due to maternity leave. Alternative reasons include military service, illness, disability, and early retirement. We use data from the Pension Register to evaluate how often a woman is reported to be on leave, but has not given birth. To do so, we select all women with a leave spell. We drop leave spells that are shorter than 2 months[12], leave spells where the woman was older than 45, leave spells that were preceded by a spell in registered unemployment[13], and leave spells during apprenticeship training[14].

Table 2: Leave spells and childbirth

	maternity leave spells, no restriction	maternity leave spells, $\neq$ first of the month	erroreously dropped spells: first of a month
N	14028	13091	1805
1	63.84 %	91.71 %	30.30 %
2	91.22 %	91.57 %	85.92 %
3	89.63 %	89.94 %	85.00 %
4	88.35 %	91.78 %	74.68 %
5	92.41 %	92.62 %	88.73 %
6	91.20 %	91.65 %	82.86 %
7	91.09 %	91.62 %	81.16 %
8	91.84 %	92.50 %	81.40 %
9	90.49 %	91.27 %	76.79 %
10	86.47 %	87.90 %	61.19 %
11	89.78 %	90.05 %	85.07 %
12	91.13 %	91.39 %	85.71 %
Total	86.64 %	90.99 %	51.91 %

Data: German Pension Register. Sample: All leave spells after restrictions have been imposed (sample 1). The first column shows the proportion of leave spells that are due to child birth in the raw data. The second column shows the proportion of leave spells that are due to child birth after leave spells that start at the first of a month have been dropped. The third column shows the proportion of leave spells that are due to child birth if the leave spell started at the first of a month.

[12] We do so because since 1979, mothers are not allowed to work 6 weeks before and 8 weeks after birth. Every woman should thus be on leave for at least 3 months.

[13] We do this because only currently employed mothers can take maternity leave.

[14] We do this because a different maternity leave legislation applies to women in apprenticeship training.

The first column of table 2 shows the proportion of leave spells that are due to childbirth ("true leave spells") in the raw data, separately by the month the leave started. In total, about 14 %f the leave spells are not due to child birth. In January, however, the fraction of incorrect spells is more than 36 %. It turns out that most of these leave spells start at the first of January. Column 2 of table 2 displays the proportion of true leave spells after spells that start at the first of a month have been dropped. Thee proportion of leave spells that are not due to child birth reduces to about 9 %. More importantly, the fraction of true leave spells is now roughly the same in all months.

Since the start date of the leave spell is not a perfect predictor for false maternity leave spells, we delete true maternity leave spells. The third column of table 2 displays the proportion of leave spells that start at the first of a month, but are true leave spells. The fraction is 30 % in January, and up to 88 % in other months. Erroneously dropping these spells is a problem if they systematically differ from the other leave spells. Table 15 in Appendix C compares the two types of spells in terms of labor supply. We find no significant differences. Hence, dropping true leave spells that start at the first of a month does not appear to be a serious problem.

The inclusion of incorrect leave spells in our sample is unfortunate, but unavoidable. We checked whether observable characteristics, such as the year and month the leave started, help to predict the incidence of incorrect leave spells. In a linear probability model, year dummies are individually insignificant, but jointly significant at a 10 % level. The same holds for month dummies. Other characteristics, such as women's education and age at childbirth, were found to be insignificant. Since maternity leave legislation was changed either in May, July, or January, a comparison between the months April and May, June and July, as well as January and December is particularly relevant. The differences between these months are small ($< 1\%$), and insignificant (p-value >0.35)[15]. We also checked whether labor market outcomes of women with incorrect leave spells vary with the year and month the leave spell started. We did not find this to be the case. Section 5.2 describes in more detail how this type of measurement error affects our estimates.

The month a mother goes on leave versus the month she gives birth A further disadvantage of our data is that it only contains information on when a mother goes on leave, but not when she gives birth. We thus have to infer the birth month of the child from the month the mother goes on leave. We use data from the Pension Register to analyze the relationship between

[15] In January 1988, job-protected leave was increased from 10 to 12 months. In July 1989, it was raised further to 15 months. The second and third change occured in July 1990 (18 months) and January 1992 (3 years). The difference between the fraction of correct leave spells in December 1987 and January 1988 is 0.00089 (p-value 0.771); it is -0.0072 (p-value 0.798) for leave spells that started in June and July 1989; it is 0.01719 (p-value 0.563) for leave spells that began in June and July 1990; and -0.0059 (p-value 0.364) for leave spells that began in December 1991 and January 1992. However, the samples are rather small (about 160 observations per month).

the month a woman gives birth and the month she goes on leave. We first select all women who give birth between January 1986 and December 1992 and take maternity leave. To make this sample comparable to our final sample, we then impose the same restrictions as in the previous section. Since women are entitled to 6 weeks of leave before birth, we expect the majority of women to go on leave about 6 weeks before their due date. We thus approximate the birthday of the child as 6 weeks after the mother went on leave. Table 3 shows that with this procedure, the month the child is born is specified as the correct birth month in about 70 %.of the cases. In about 12 % of the cases, the actual birth occurred either one month before or one month after our recorded birth. The second pair of columns in table 3 reveal that the distribution is somewhat asymmetric: There are more "too early" than "too late" child births (13.09 % vs 17.11 %). This is not surprising since women who are sick during pregnancy are likely to go on leave earlier.

Table 3: True birth month and imputed birth month

	N=11198		N=11198
birth occured ...			
more than one month before ...	0.64 %	birth occured .	
one month before	12.50 %	before	13.09 %
in the same month as ...	69.80 %	in the same month as ...	69.80 %
one month after ...	11.88 %	after ...	17.11 %
more than one month after ...	5.23 %	the imputed birth	
the imputed birth			

Data: German Pension Register. Sample: All leave spells that are due to child birth (sample 3).

We checked whether observable characteristics help to predict the probability of a correct birth month. Both year and month dummies are jointly insignificant (p-values of 0.3535 and 0.5369, respectively). Other characteristics were not found to be significant either. In Section 5.2, we describe how we deal with this type of measurement error.

Children and hours worked A final disadvantage of our data is that we only observe whether a woman works full- or part-time, but not the number of hours worked. A reduction in the daily wage after child birth could thus be either due to a reduction in the number of hours worked -conditional on working full-time or part-time, or due to a reduction in the hourly wage rate. We use data from the German Microcensus to evaluate how children affect the number of hours worked. The first panel of table 4 reports actual working hours for women who were regularly employed

during the survey week, and had non-zero working hours[16]. The second panel repeats the analysis for women who worked at least 20 hours in the survey week. We imposed this tighter restriction in order to approximate employment relationships for which social security contributions have to be paid. Both panels reveal the same picture. Clearly, women with children are more likely to work part-time. However, the number of actual hours worked, conditional on working full-time or part-time, varies very little with the number of children. The hypothesis that the number of actual working hours is the same for women with and without children cannot be rejected, not even at a 20 % significance level. Hence, any difference between wages before and after child birth -conditional on working full-time or part-time- should be mostly due to differences in hourly wages, rather than due to differences in hours worked.

Table 4: Actual weekly hours and number of children: Evidence from the German Microcensus (1991)

	actual working hours > 0				
		youngest child ...			
	no children	0-2 years old	3-5 years old	6-9 years old	older than 9
Propoprtion working	85.2 %	13.4 %	41.2 %	48.2 %	60.5 %
full-time	92.61 %	35.82 %	31.79 %	33.88 %	47.30 %
actual working hours	**39.8 h**	**40.2 h**	**40.1 h**	**39.9 h**	**40.1 h**
part-time	7.39 %	64.18 %	68.21 %	66.12 %	52.70 %
actual working hours	**17.8 h**	**17.5 h**	**17.7 h**	**17.8 h**	**17.6 h**
N (working women only)	15289	1745	1837	2273	2665
	actual working hours > 20				
		youngest child ...			
	no children	0-2 years old	3-5 years old	6-9 years old	older than 9
Proportion working	84.9 %	8.4 %	37.2 %	43.2 %	52.5 %
full-time	93.51	38.71	33.54 %	35.61 %	50.20 %
actual working hours	**40.1 h**	**40.3 h**	**40.0 h**	**40.2 h**	**40.1 h**
part-time	6.49 %	61.29 %	66.46 %	64.39 %	49.80 %
actual working hours	**24.3 h**	**23.9 h**	**24.1 h**	**24.0 h**	**24.1 h**
N (working women only)	14321	1394	1427	1801	2665

Data: German Microcensus. Sample: West German women between 20 and 40 whose highest degree completed is an apprenticeship degree.

[16] We require women to have non-zero working hours because some women on maternity leave report to be regurly employed with 0 working hours.

Variable Description We now briefly describe the main variables used in the empirical analysis. Details can be found in Appendix B. The month a woman returns to work after childbirth is the month she is first observed working after giving birth, conditional on being employed for at least two consecutive months. We impose this restriction because up to 5 % of women return to work for less than two months, typically right when job-protected leave expires. Many of these women return to work only many years later.

A woman is considered as working t months after childbirth if at $t-1$, t, or $t+1$, she has returned to work and is reported to be working. Hence, according to this definition, a woman is working 6 months after childbirth if she worked at either the 5th, 6th, or 7th month after giving birth. We find it convenient to define women's employment status in this way because in about 30 % of the cases, we over- or underestimate the child's birth month by one month. It is important to stress that women on so-called marginal jobs, i.e. jobs with less than 15 hours per week, are not considered as working.

Pre-birth characteristics, such as the wage and full-time status, refer to 9 months before childbirth, i.e. around the time the child was conceived.

Table 5: The measurement of wages in the BLH data: An example

	childbirth	1 year		2 years		3 years after
woman 1	12/85	12/86	1/87 – 12/87	1/88 – 12/88		1/89
		returning: 7/86				
		wage: 7-12	wage: 13-24	wage: 25-37		
woman 2		1/86 – 12/86	1/87 – 12/87	1/88 – 12/88		1/89
		returning: 11/86				
		wage: 10-11	wage: 12-23	wage: 24-36		

Woman 1 gives birth in December 1985, returns to work in July 1986, and continues to work for the same employer in the next three years. Woman 2 gives birth in January 1986, returns to work in November 1986, and continues to work for the same employer in the next three years.

Unlike our employment data, which refers to a point in time, our wage data refers to a spell. Table 5 illustrates how wages are measured in our data. Consider a woman who gives birth in December 1985 and is entitled to 6 months of job-protected leave. Suppose she returns to work at the end of the leave period in July 1986. Further suppose that for the next 3 years she keeps working for a pre-birth employer. For this woman, we observe the average daily wage between July and December 1986, i.e. the average daily wage between the 7th and 12th month after childbirth. The next wage observation refers to January till December 1987, i.e. to the 13th till 24th months

after childbirth, and so on. Next, consider a woman who gives birth in January 1986 and is eligible for 10 months of job-protected leave. Suppose she returns to work at the end of the leave period in November 1986, and continues to work for her pre-birth employer for the next three years. For this woman, we observe the average daily wage between November and December 1986, i.e. the average daily wage between the 10th and 11th month after childbirth. The second wage observation refers to January till December 1987, i.e. to the 12th till 23rd month after childbirth. For these two women, we define the wage 1 year after childbirth to be the wage they earned between January and December 1987. It is important to note that for this wage spell, the woman who gives birth in December 1985 has one additional month of post-birth work experience. This is even more of a problem if we compare women who give birth in November 1985 and February 1986. To see how the measurement of wages affects our results, we will compare wages of women who gave birth in December (November) and January (February) in a year in which there was no change in maternity leave legislation.

Sample Characteristics This section briefly describes the main characteristics of our sample. Column 3 and 4 of Table 6 show the number of all births in West Germany as well as the number of births in our data. The first thing to note is that in years with a higher number of births in West Germany we also observe a higher number of births in our data. The ratio between the number of births in our data and total births in the country (column 5) is likely to be a lower bound for the fraction of mothers who go on maternity leave. It is a lower bound since, among other reasons, our data excludes about 15 % of the German work force, such as civil servants. We also exclude women in (West-)Berlin, and women with a foreign citizenship. The second thing to note is that the incidence of leave taking appears to have increased over time period under consideration: The fraction between the number of observations in our data and total number of births increased from 19 % in 1978 to 33 % in 1992.

Table 7 provides more reliable estimates for the fraction of mothers who take maternity leave using data from the German Pension Register. The table reports results separately by mother's education and by children's birth year. Unfortunately, the pension data is only available from 1986 onwards. As expected, the pension data reveals a substantially higher incidence of leave taking. In line with the results in Table 6, the fraction of mothers on maternity leave has increased from about 48 % in 1986 to about 54 % in 1992. This increase in leave taking could be a consequence of the expansions in maternity leave legislation. Our estimation strategy does not allow us to evaluate this hypothesis. Somewhat surprisingly, medium-educated women are most likely to go on maternity leave[17].

[17] Here, it is important to bear in mind that our data excludes women in the public sector. College graduates

Table 6: Number of Births vs Number of Observations in Data

1	2	3	4	5	6
	ML	# births	# observations	Proportion	fertility rate
1978	2	576 468	106 443	18.46 %	1.378
1979	2/6	581 984	115 944	19.92 %	1.377
1980	6	620 657	130 711	21.06 %	1.443
1981	6	624 557	155 539	24.90 %	1.433
1982	6	621 173	175 872	28.31 %	1.405
1983	6	594 177	166 363	28.00 %	1.329
1984	6	584 157	158 148	27.07 %	1.289
1985	6	586 155	162 777	27.77 %	1.279
1986	10	625 963	182 392	29.14 %	1.344
1987	10/12	642 010	191 836	29.88 %	1.366
1988	12	677 259	206 340	30.47 %	1.411
1989	12/15	681 537	204 439	30.00 %	1.394
1990	15/18	727 199	231 666	31.86 %	1.448
1991	18	722 250	243 664	33.73 %	1.420
1992	36	720 794	241 755	33.54 %	1.400

Column 2: number of weeks of job-protected leave. Column 3: number of births in West-Germany. Column 4: number of observations in data. Column 5: Ratio number of observations in data/number of births. Column 5: average number of children of women 15-45 years old.

Table 7: How many women take maternity leave? Evidence from the German Pension Register

	all		low		medium		high	
	N	%	N	%	N	%		
1986	4384	48.86 %	728	37.64 %	3428	51.92 %	228	38.60 %
1987	4563	48.81 %	793	40.98 %	3578	50.81 %	192	43.75 %
1988	4831	50.42 %	786	42.75 %	3786	50.81 %	259	49.035 %
1989	4755	50.89 %	748	40.51 %	3758	53.59 %	249	41.37 %
1990	4760	52.02 %	673	42.79 %	3842	53.59 %	245	38.37 %
1991	4760	54.50 %	633	42.18 %	3766	57.27 %	241	43.57 %
1992	4751	54.70 %	637	45.05 %	3858	56.79 %	256	47.27 %

Data: German Pension Register. Sample 2. Low: no post-secondary education. Medium: apprenticeship degree. High: college degree.

A more generous leave policy may also affect women's fertility. Column 6 of Table 6 reports the fertility rate, i.e. the average number of children of women who are between 15 and 45 years old. While there are sizable fluctuations over time, there appears to be no long-run trend.

Table 8 reports pre-birth characteristics of mothers on maternity leave in our data, by the birth year of the child. The first set of columns refer to all mothers on leave. The last set of columns refer to mothers with an apprenticeship degree, the group our empirical analysis focuses on. The table shows an increase the proportion of mothers with an apprenticeship degree as well as an increase in the pre-birth wage. Moreover, the average age at childbirth has increased from in 1978 to in 1992. A similar trend has been observed in many developed countries. Finally, part-time work has become increasingly common since the early 80s. These trends are important to bear in mind when interpreting the empirical results.

5 Estimation strategy

This section describes our estimation strategy. We first describe how we estimate the causal effect of maternity leave legislation on labor supply and wages assuming that there is no measurement error (subsection 5.1). We then explain how we deal with the two types of measurement error we face (subsection 5.2).

are overrepresented in the public sector. At the same time, women in the public sector may be more likely to take maternity leave.

Table 8: Pre-birth Characteristics of Mothers by Birth Year of Child

			all mothers			apprentices only		
	1	2	3	4	5	6	7	8
	ML	apprentices	age	wage	part-time	age	wage	part-time
1978	2	73.23 %	28.45	4.55	15.94 %	27.00	4.434	13.35 %
1979	2/6	73.45 %	28.45	4.60	17.02 %	27.24	4.450	13.89 %
1980	6	74.47 %	28.98	4.63	16.90 %	27.30	4.459	13.83 %
1981	6	76.14 %	28.64	4.63	15.76 %	27.19	4.481	13.33 %
1982	6	78.00 %	28.41	4.622	14.64 %	27.12	4.487	12.67 %
1983	6	78.80 %	28.69	4.63	14.95 %	27.32	4.485	12.89 %
1984	6	78.87 %	29.04	4.64	16.03 %	27.57	4.484	13.97 %
1985	6	79.57 %	29.18	4.66	16.69 %	27.62	4.487	14.44 %
1986	10	80.35 %	29.28	4.69	17.58 %	27.70	4.500	15.45 %
1987	10/12	80.94 %	29.39	4.73	17.86 %	27.77	4.531	15.75 %
1988	12	81.59 %	29.49	4.76	18.48 %	27.80	4.548	16.40 %
1989	12/15	81.61 %	29.68	4.78	19.06 %	27.89	4.548	16.87 %
1990	15/18	82.16 %	29.86	4.80	20.07 %	28.03	4.559	17.94 %
1991	18	82.12 %	30.16	4.83	20.41 %	28.26	4.586	18.31 %
1992	36	82.48 %	30.50	4.87	21.07 %	28.51	4.611	18.93 %

Column 2: number of weeks of job-protected leave. Column 3: Proportion of mothers with an apprenticeship degree. Column 4: Age at birth of all mothers. Column 5-6: Wage and part-time status 9 months before childbirth of all mothers. Column 7: Age at birth of mothers with an apprenticeship degree. Column 8-9: Wage and part-time status 9 months before childbirth of mothers with an apprenticeship degree.

5.1 The idea

We identify the causal effect of maternity leave legislation on labor market outcomes by comparing women who give just before and just after the law changed. Consider for instance the increase in job-protected leave from 2 to 6 months that took place in May 1979. Here, our estimation strategy amounts to comparing women who give birth in April and are subject to 2 months of job-protected leave with women who give birth in May and are subject to 6 months of job-protected leave. Our identifying assumption is that it is random whether a woman gives birth in April or in May. We can partially test the validity of this assumption by comparing labor market outcomes of women who give birth in April and May in years in which there was no change in maternity leave legislation. We find no systematic differences between these two groups of women. The same holds for the other changes in maternity leave legislation.

Yet, there are reasons why our identifying assumption might be violated. First, our identification strategy would not be valid if women time the birth of their child as a response to the change in law. We believe that this is unlikely, at least for the reforms that took place in 1979, 1986, 1989 and 1992[18]. This is because parents could not anticipate these reforms. We searched three leading German newspapers[19] for articles about the reform. The first articles typically appear two to three months before the reform was finally implemented. By that time, children who were born around the change in the law were already conceived. It is true that women still have some possibilities to time the birth of their child through induced births and cesarean cuts. However, induced births and cesarean cuts mostly allow women to bring the birth date forward - whereas in our case women would like to postpone child birth in order to be eligible for the more generous leave policy. We also would like to point out that throughout the time period of consideration, cesarean cuts were relatively rare and predominantly occurred for medical reasons.

Second, even if it is random whether a woman gives birth shortly before or shortly after a change in law, the probability that she takes maternity leave may not be exogenous, and could be influenced by the change in law. That is, a woman who expects to give birth in May and thus would be eligible for 6 months of leave may be more likely to take maternity leave than a woman who expects to give birth in April and thus would be eligible for only 2 months of leave. Consequently, women who give birth in April or May *and* take maternity leave may differ. Women have to notify their employer about their plans to take maternity leave only one month before they expect to go on leave. From our newspaper search, it is possible that women knew about the reform early enough so that it could influence their decision to take maternity leave. To check

[18] The 1988 reform that extended job-protected leave from 10 to 12 months was already decided in 1986. The 1990 reform that extended job-protected leave from 15 to 18 months was already decided in 1989.

[19] The search was conducted for the following newspapers: Süddeutsche Zeitung, Frankfurter Allgemeine, and Die Zeit.

whether this is a problem, we first compare *pre-birth* labor market outcomes of mothers who gave birth shortly before and after an extension in maternity leave legislation. Table 9 reports results for the three main expansions in job-protected leave. For each change, the first (-1m/+1m) and second (-3m/+3m) row refers women who gave birth one or three months before and one or three months after the change in the law, while the third row compares labor market outcomes of women who gave birth one year before and one year after child birth. Age at childbirth as well as the pre-birth wage and part-time status refer to mothers with an apprenticeship degree -the group we focus on in the empirical analysis. The table shows that for women who give birth one month before and after a change in the law, pre-birth labor market outcomes are very similar, and not statistically different from each other. Differences between labor market outcomes of women who give birth three months before and after an expansion in job protected leave tend to be somewhat larger, and are sometimes statistically significant. Differences between labor market outcomes of women who gave birth one year before and after a change in maternity leave legislation tend to be largest, and are always statistically significant. This reflects the secular increase in part-time work, pre-birth wages and age at childbirth that was already visible in Table 8.

We also use the pension data to check whether there is a discontinuity in the fraction of women

Table 9: Differences between Observable Pre-Birth Characteristics of Mothers Who Give Birth Shortly Before and Shortly After the Change in Maternity Leave Legislation

		2 vs 6 months		
	prop. appr.	wage	age	part-time
-1m/+1m	0.0086 (0.0061)	0.0015 (0.0079)	-0.0723 (0.0988)	-0.0077 (0.0059)
-3m/+3m	0.0072 (0.0038)	0.0053 (0.0046)	0.0875 (0.0567)	-0.0093 (0.0035)
-1y/+1y	0.0093 (0.0018)	0.0140 (0.0020)	0.1864 (0.0275)	0.0019 (0.0017)
		6 vs 10 months		
	prop. appr.	wage	age	part-time
-1m/+1m	0.0042 (0.0050)	0.0076 (0.0059)	-0.0342 (0.0737)	0.0066 (0.0049)
-3m/+3m	0.0081 (0.0028)	0.0012 (0.0034)	0.0569 (0.0537)	0.0063 (0.0028)
-1y/+1y	0.0078 (0.0014)	0.0128 (0.0016)	0.0796 (0.0196)	0.0102 (0.0014)
		18 vs 36 months		
	prop. appr.	wage	age	part-time
-1m/+1m	0.0013 (0.0037)	0.0074 (0.0047)	-0.0020 (0.0533)	0.0030 (0.0042)
-3m/+3m	0.0083 (0.0022)	0.0015 (0.0028)	0.0914 (0.0568)	0.0082 (0.0025)
-1y/+1y	0.0036 (0.0011)	0.0252 (0.0014)	0.2498 (0.01495)	0.0062 (0.0012)

-1m/+1m: 1 month before and after the change in law. -3m/+3m: 3 months before and after the change in law. -1y/+1y: 1 year before and after the change in law. Wage, age, and part-time status refer to mothers with an apprenticeship only.

taking maternity leave when job-protected leave is extended. Since the data starts in 1986 only, we

are not able to evaluate the impact of the early extensions in job protected leave -i.e. the increase from 2 to 6 months and the increase from 6 to 10 months- on the incidence of leave-taking. Results for the changes that occurred after 1986 can be found in Appendix D. We find no significant increase or drop in the incidence of leave taking at the time of a change in the law, although the sample size may be too small to draw definite conclusions.

A final remark is in order. Our identification strategy allows us to identify only the immediate effect of a change in maternity leave legislation on labor market outcomes. It is possible that maternity leave legislation has a long-term effect on labor market outcomes through slowly changing society's attitudes towards labor force participation of young mothers. Our estimation strategy does not allow us to pick up this effect.

5.2 Measurement Error

So far, we have ignored the two types of measurement error we face. First, in our data, the birth month is correctly measured only in about 70 % of all births. In about 20 % of the cases, we either over- or underestimate the true birth month by one month (see Table 3). Second, in our data, only 91 % of all leave spells are due to childbirth (see Table 2). This section describes how we deal with these two types of measurement error. We begin with the mis-recording of the month the child was born.

Consider the increase in maternity leave from 2 to 6 months that occurred in May 1979. Suppose that the difference in labor market outcomes of women giving birth in April and May identifies the causal effect of this change, and is thus the parameter of we would like to estimate. How does the mis-recording of the birth month affect this estimate? Let Y_j^M denote the labor market outcome (e.g. working full-time 1 year after childbirth) of women who give birth in month j and to whom maternity leave legislation M applies. Let P_0 denote the proportion of births that are correctly recorded. P_{-1} denotes the proportion of births that are recorded one month too late (e.g. the true birth month is March, but we record April). P_{+1} and P_{+2} denote the proportion of births that are recorded one or two month too early (e.g. the true birth month is April, but we record March or February). For simplicity, we ignore the very few births (less than 1 %) where the true birth occurred more than one month before the imputed birth. From Table 3, $P_{-1}, P_0,$ and P_{+1} are estimated as $\widehat{P}_{-1} = 0.1250$, $\widehat{P}_0 = 0.6980$, $\widehat{P}_{+1} = 0.1188$, and $\widehat{P}_{+2} = 0.0523$. It is important to stress that these fractions appear to be independent of the year and month a woman gives birth. The parameter we would like to estimate is $Y^2_{April} - Y^6_{May}$. The difference between labor market outcomes of women whom we record to give birth in April and May, $\overline{Y}^2_{April} - \overline{Y}^6_{May}$, equals

$$\begin{aligned}\overline{Y}^2_{April} - \overline{Y}^6_{May} &= (P_{-1}Y^2_{March} + P_0 Y^2_{April} + P_{+1}Y^6_{May} + P_{+2}Y^6_{June}) \\ &\quad -(P_{-1}Y^2_{April} + P_0 Y^6_{May} + P_{+1}Y^6_{June} + P_{+2}Y^6_{July}).\end{aligned}$$

Under the assumptions that $Y^2_{March} = Y^2_{April}$, $Y^6_{May} = Y^6_{June} = Y^6_{July}$,this difference equals $P_0(Y^2_{April} - Y^6_{May})$. Hence, we can obtain an estimate for $Y^2_{April} - Y^6_{May}$ as

$$(Y^2_{April} - Y^6_{May})^e = \frac{\overline{Y}^2_{April} - \overline{Y}^6_{May}}{\widehat{P}_0}. \tag{1}$$

We can also compare labor market outcomes of women whom we record to give birth in March and June. The difference in labor market outcomes for these two groups of women, $\overline{Y}^2_{Feb} - \overline{Y}^6_{June}$, equals

$$\begin{aligned} \overline{Y}^2_{March.} - \overline{Y}^6_{June} &= (P_{-1}Y^2_{Feb} + P_0 Y^2_{March.} + P_{+1}Y^2_{April} + P_{+2}Y^6_{May}) \\ &\quad -(P_{-1}Y^6_{May} + P_0 Y^6_{June} + P_{+1}Y^6_{July} + P_{+2}Y^6_{August}). \end{aligned}$$

Under the assumptions that $Y^2_{Feb} = Y^2_{March} = Y^2_{April}$, $Y^6_{May} = Y^6_{June} = Y^6_{July} = Y^6_{Aug}$, this difference equals $(1 - P_{+2})(Y^2_{April} - Y^6_{May})$. We can thus get an alternative estimate for $Y^2_{April} - Y^6_{May}$ as

$$(Y^2_{April} - Y^6_{May})^e = \frac{\overline{Y}^2_{March} - \overline{Y}^6_{June}}{1 - \widehat{P}_{+2}}. \tag{2}$$

A third alternative is to compare labor market outcomes of women whom we record to give birth in March and June. The difference in labor market outcomes for these two groups of women, $\overline{Y}^2_{Feb} - \overline{Y}^6_{June}$, equals

$$\begin{aligned} \overline{Y}^2_{Feb} - \overline{Y}^6_{June} &= (P_{-1}Y^2_{Jan} + P_0 Y^2_{Feb} + P_{+1}Y^2_{March} + P_{+2}Y^2_{April}) \\ &\quad -(P_{-1}Y^6_{May} + P_0 Y^6_{June} + P_{+1}Y^6_{July} + P_{+2}Y^6_{August}). \end{aligned}$$

Under the assumptions that $Y^2_{Jan.} = Y^2_{Feb.} = Y^2_{March} = Y^2_{April}$, and $Y^6_{May} = Y^6_{June} = Y^6_{July} = Y^6_{Aug}$, this difference equals $Y^2_{April} - Y^6_{May}$. We can thus get third estimate for $Y^2_{April} - Y^6_{May}$ as

$$(Y^2_{April} - Y^6_{May})^e = \overline{Y}^2_{Feb.} - \overline{Y}^6_{Aug.}. \tag{3}$$

Compared to (1) and (2), this estimate does not require an estimate for P_0 or P_{+2},but relies on the additional assumption that $Y^2_{Jan} = Y^2_{April}$ and $Y^6_{June} = Y^6_{August}$. In the empirical analysis, we first plot labor market outcomes against the month women give birth. This gives us a visual expression on how much labor market outcomes vary month by month. We then report estimates for the impact of maternity leave legislation using formulas (1), (2), and (3). All methods yield similar estimates. We are thus confident that the measurement error of the child's birth month has little impact on our estimates.

The second type of measurement error is that only 91 % of leave spells are due to childbirth. Again, it's important to stress that the fraction of true leave spells appears to be independent of

the month and year a woman gives birth. Moreover, labor market outcomes of women with leave spells that are not due to childbirth do not vary with the year and month the leave spell started. Let p denote the proportion of correct leave spells, i.e. leave spells that are due to childbirth. As before, let Y_j^M denote a labor market outcome of women who give birth in month j and to whom maternity leave legislation M applies. Labor market outcomes of women whose leave spell started in month j but have not given birth are denoted by I_j. Ignoring that the child's birth month is measured with error, the difference between labor market outcomes of women whose leave spell started in April and May equals

$$\overline{Y}^2_{April} - \overline{Y}^6_{May} = (pY^2_{April} + (1-p)I_{April}) - (pY^6_{May} + (1-p)I_{May}).$$

Under the assumption that $I_{April} = I_{May}$ -which is supported by the data-, $\overline{Y}^2_{April} - \overline{Y}^6_{May} = p(Y^2_{April} - Y^6_{May})$. Hence, this type of measurement error will lead to an underestimate of the causal impact of maternity leave legislation on labor market outcomes. Since the fraction of incorrect leave spells is relatively small, we decided not to correct for it.

6 Results

We first analyze the impact of maternity leave legislation on labor supply, for women who take maternity leave (Section 6.1). We then turn to the impact of maternity leave legislation on earnings and wages (Section 6.2). Our baseline results refer to women who completed an apprenticeship.

6.1 Maternity leave and labor supply

We begin with the impact of maternity leave legislation on women's labor supply after childbirth. We then distinguish between part time and full time employment. In a third step, we analyze which women (e.g. high educated workers) are most affected by a change in maternity leave legislation. Finally, we offer some explanations for our findings.

6.1.1 Proportion of women working

We begin with a graphical analysis. Figure 1 plots the proportion of women who return to work t months after their child was born. The left figure refers to all women who went on maternity leave, while the right figure refers to women who went on maternity leave and returned to the labor market within 8 years after giving birth. The figure reveals that a large fraction of mothers return exactly when maternity leave expires. This fraction is lower for more generous leave policies. For instance, in the late 70s when women were entitled to 2 months of job-protected leave, 28 % of women returned to work exactly two months after childbirth. In 1992, when women were entitled

Figure 1: Proportion of mothers who return to work t months after childbirth

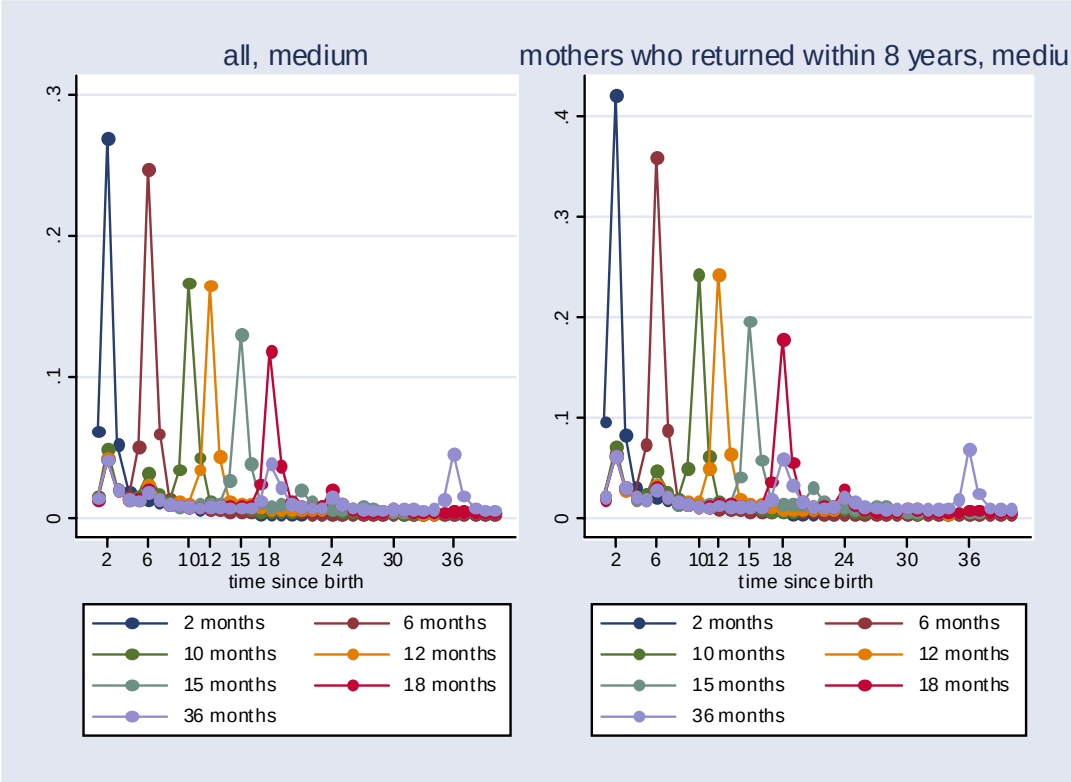
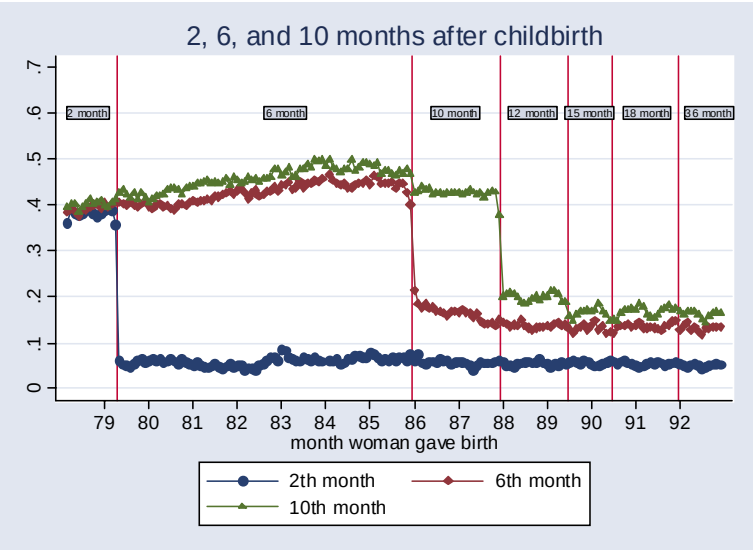


Figure 2: Fraction of Women Working 2, 6 and 10 Months after Childbirth, by Month Woman Gave Birth



to 3 years of job-protected leave, 6 % returned to work exactly 3 years after childbirth. When we focus on women who return to the labor market within 8 years after childbirth, these fractions increase to 41 % and 9 %, respectively. Moreover, the fraction of women who return to work in the month before or after maternity leave expires is higher than in other months. This is expected since in about 30 % of the cases, we over-or underestimate the birth month by one month. Finally, we observe a higher fraction of women returning to the labor market when maternity *benefits* are reduced or expire (i.e. after 2, 6, or 18 months), indicating that women do not only care about a job guarantee, but also about maternity benefits.

Next, we turn to the fraction of women working at several points of time after childbirth. We again start with a graphical analysis. In Figures 2 to 4, the x-axis refer to the month a woman gives birth. Each dot represents the average proportion of women who are working t months after child birth. The vertical lines indicate a change in maternity leave legislation, while the boxes list the number of months women are entitled to job-protected leave. The figures nicely illustrate that each change in the law induced women to postpone their return to work. Consider for instance the increase in job-protected leave from 2 to 6 months. For this change, the proportion of women working two months after childbirth drops by almost 35 percentage points, from about 41 % for women who give birth in March 1979 to about 5 % for women who give birth in June 1979. In line with Figure 1, the drop is smaller for the longer extensions. For instance, the fraction of women

Figure 3: Fraction of Women Working 12, 15, and 18 Months after Childbirth, by Month Woman Gave Birth

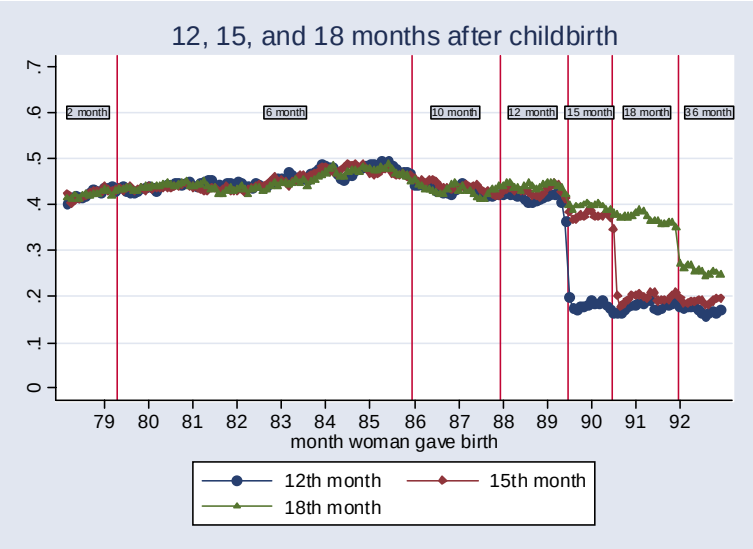
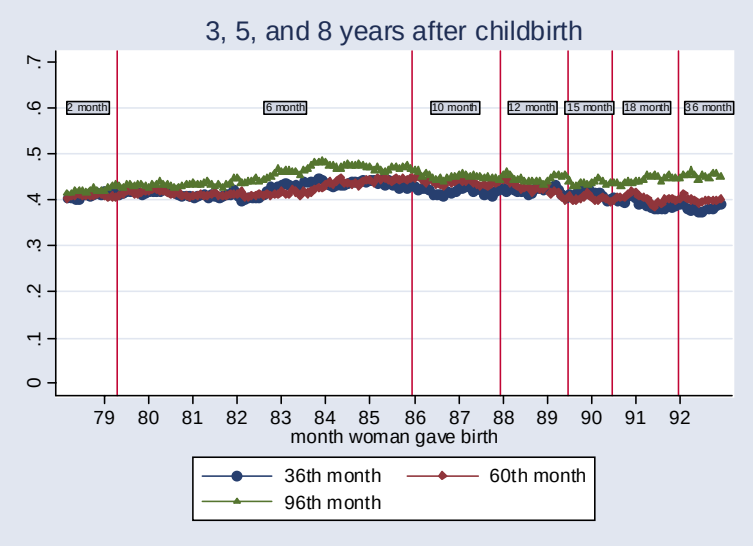


Figure 4: Fraction of Women Working 3, 5, and 8 Years after Childbirth, by Month Woman Gave Birth



working 18 months after childbirth decreases only by about 10 % when maternity leave is extended from 18 to 36 months, from about 36 % for women giving birth in November 1991 to about 25 % for women giving birth in February 1992 (Figure 3).

What about the long-term effects of maternity leave legislation on labor supply? From Figure 2, there is some evidence that the extension of job-protected leave from 6 to 10 month lowered the fraction of women working 10 months after childbirth by about 3 percentage points. However, the decline disappears once we look at the fraction of women working 1 year or later after childbirth. Likewise, there is little evidence for a discontinuous jump in the fraction of women working in the long-run for any other increase in job-protected leave. Hence, changes in maternity leave legislation do not appear to have a long-term impact on female labor supply after childbirth.

Figures 2 to 4 reveal other interesting patterns. Most importantly, once maternity leave expires the fraction of women working rises only little, and may even decline slightly. For instance, for women who gave birth in March 1979, the fraction of women working 2 months after childbirth was about 41 %, compared to 43.5 % 8 years after childbirth. On the other hand, 64 % had returned to the labor market at some point of time within 8 years after childbirth. This illustrates that many women do not permanently return to work, possibly to have another child. Hence, focusing on women's return decision alone could give a misleading picture.

It is also interesting to point out the long-run trends in labor supply of women with small children. From Table 6 and 7 in Section 8, there is evidence that leave taking has become increasingly common among mothers. Throughout the early 80s, we also observe a substantial increase in the fraction of women working after childbirth, both in the medium (e.g.. 1-3 years after childbirth) and long-term (e.g. 5-8 years after childbirth). However, since the mid-80s the fraction of women working seems to have declined somewhat in the medium-run (see Figure 3), and remained roughly constant in the long-run (see Figure 4). Since there is no discontinuous jump in the fraction of women working in the long-run around the change in maternity leave legislation, these changes are not immediately responsible for these long-run trends.

Table 10 reports our estimates for the impact of an extension in job-protected leave on the fraction of women working t months after childbirth. The table focuses on the three main changes in May 1979 (from 2 to 6 month), January 1985 (from 6 to 10 months), and January 1992 (from 18 to 36 months). For each change, the first row (+1m/-1m) compares labor force participation rates of women who gave birth one month before and one month after the change in law. The second row (+1m/-1m, corrected) corrects for measurement error in a way described in Section 5.2. Similarly, rows 3 and 4 (+2m/-2m; +2m/-2m corrected) report the difference in labor force participation rates of women who gave birth 2 months before and after the change in law, and

Table 10: Maternity Leave Legislation and Labor Force Participation Rates

				1st change: 2 months vs 6 months				
	2	6	10	12	18	36	60	96
Working March 79	0.4219	0.4466	0.4478	0.4445	0.4551	0.4405	0.4380	0.4353
-1/+1	**-0.2412**	-0.0028	-0.0068	-0.0006	-0.0061	0.0017	0.0008	0.0002
	(0.0072)	(0.0084)	(0.0084)	(0.0084)	(0.0084)	(0.0084)	(0.0083)	(0.0083)
-1/+1, corrected	**-0.3455**	-0.0040	-0.0100	0.0009	-0.0087	0.0024	0.0011	0.0003
-2/+2	**-0.3429**	-0.0030	0.0032	0.0063	0.0044	0.0016	0.0048	0.0032
	(0.0068)	(0.0085)	(0.0085)	(0.0085)	(0.0085)	(0.0085)	(0.0084)	(0.0084)
-2/+2, corrected	**-0.3618**	-0.0031	0.0033	0.0066	0.0048	0.0017	0.0050	0.0037
-3/+2	**-0.3611**	-0.0025	0.0042	-0.0054	-0.0041	-0.0081	-0.0047	-0.0037
	(0.0069)	(0.0091)	(0.0086)	(0.0062)	(0.0091)	(0.0061)	(0.0061)	(0.0062)
-1 year/+1 year	**-0.3210**	*0.0100*	*0.0145*	*0.0103*	*0.0110*	*0.0150*	*0.0106*	0.0103
	(0.0019)	(0.0024)	(0.0019)	(0.0021)	(0.0022)	(0.0021)	(0.0024)	(0.0024)
				2nd change: 6 months vs 10 months				
	2	6	10	12	18	36	60	96
Working Nov. 85	0.0929	0.4274	0.4578	0.4596	0.4586	0.4351	0.4446	0.4603
-1/+1	0.0003	**-0.1932**	*-0.0394*	-0.0086	-0.0048	0.0065	0.0019	0.0033
	(0.0040)	(0.0062)	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)
-1/+1, corrected	0.0004	**-0.2767**	*-0.0560*	-0.0109	-0.0058	0.0098	0.0027	0.0047
-2/+2	0.0023	**-0.2418**	*-0.0338*	-0.0099	-0.0065	0.0056	0.0062	0.0069
	(0.0037)	(0.0064)	(0.0065)	(0.0071)	(0.0071)	(0.0065)	(0.0071)	(0.0071)
-2/+2, corrected	0.0024	**-0.2554**	*-0.0350*	-0.0101	-0.0065	0.0058	0.0065	0.0072
-3/+2	0.00006	**-0.2715**	*-0.0328*	-0.0101	-0.0094	-0.0036	0.0035	0.0026
	(0.0036)	(0.0058)	(0.0048)	(0.0065)	(0.0065)	(0.0067)	(0.0068)	(0.0069)
-1 year/+1 year	0.0062	**-0.2695**	*-0.0585*	*-0.0400*	*-0.0257*	*-0.0226*	*-0.0155*	*-0.0116*
	(0.0011)	(0.0017)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)
				6th change: 18 months vs 36 months				
	2	6	10	12	18	36	60	96
Working Nov. 91	0.0834	0.1388	0.1743	0.1810	0.3591	0.3815	0.3923	0.4473
-1/+1	-0.0037	-0.0066	*-0.0116*	*-0.0118*	**-0.0790**	-0.0041	-0.0024	0.0070
	(0.0029)	(0.0038)	(0.0041)	(0.0042)	(0.0049)	(0.0052)	(0.0053)	(0.0054)
-1/+1, corrected	-0.0053	-0.0094	*-0.0166*	*-0.0169*	**-0.1131**	-0.0058	-0.0034	0.0100
-2/+2	-0.0029	*-0.0093*	*-0.0125*	*-0.0101*	**-0.0987**	-0.0001	0.0065	0.0049
	(0.0030)	(0.0039)	(0.0043)	(0.0042)	(0.0052)	(0.0054)	(0. 0055)	(0.0055)
-2/+2, corrected	-0.0030	*-0.0098*	*-0.0131*	*-0.0105*	**-0.1032**	-0.0001	0.0068	0.0052
-3/+2	-0.0013	-0.0096	*-0.0090*	*-0.0116*	**-0.0966**	0.0055	0.0023	-0.0032
	(0.0030)	(0.0039)	(0.0042)	(0.0044)	(0.0051)	(0.0055)	(0.0031)	(0.0055)
-1 year/+1 year	-0.0013	*-0.0027*	*-0.0070*	*-0.0049*	**-0.1074**	*0.0082*	*0.0088*	*0.0086*
	(0.0009)	(0.0012)	(0.0013)	(0.0013)	(0.0016)	(0.0017)	(0.0017)	(0.0018)

-1m/+1m: 1 month before and after the change in law. -1m/+1m, corrected: -1m/+1m divided by the fraction of women for which birth month is correctly measured (0.698), -2m/+2m: 2 months before and after the change in law. -2m/+2m, corrected: -2/+2 divided by the fraction if women for which birth month is correctly measured or under- or overestimated by one month (0.948). -3/+2: 3 months before and 2 months after the change in law.

correct for measurement error. Finally, rows 5 and 6 compare labor market outcomes of women who gave birth 3 months before and 2 months after and 1 year before and after the change in maternity leave legislation, respectively. Once we correct for measurement error, comparing labor market outcomes of women who gave birth 1, 2 or 3 months before or after childbirth give very similar results. As it was visible from Figures 2 to 4, there is strong evidence that an extension in job-protected leave induces women to postpone their return to work; this is particularly the case for the increase from 2 to 6 month as well as for the increase from 6 to 10 months. For the increase in job protected leave from 18 to 36 months, there is some evidence that the extension did not only lower the proportion of women working 18 months, but also 6 to 12 months after childbirth. Moreover, the estimates confirm that the extensions in maternity leave had virtually no effect on women's labor force participation rate in the long-run: participation rates are very similar -and not statistically significant- for women who give birth shortly before or after a change in maternity leave legislation. However, in line with Figures 2 to 4, participation rates of women giving birth 1 year before and after the change in law are statistically significant and, in particular for the extension from 6 to 10 months, of sizable magnitude. This illustrates that one needs to compare labor market outcomes of women who give birth *shortly* before and after the change in law in order not to confound the true effect of the change with pre-existing time trends.

6.1.2 Proportion of women working full-time

From the previous section, our results indicate that an extension in job-protected leave induces women to delay their return to work, but has no long-term effect on their labor force participation rate. In this section, we ask: Does an extension in job-protected leave affect the number of hours worked, conditional on participating in the labor market? Table 11 shows that part-time work is common for women with young children. Among women who gave birth in March 1979 and were working two months after childbirth, 75 % were working full-time. For the same cohort, the fraction of women working full-time 8 years after childbirth, conditional on working, reduces to about 59 %. For later cohorts, part-time work is more common. For instance, among women who gave birth in November 1991 and were working 8 years after childbirth, only 45 % are working full-time. To what extent are the reforms in maternity leave legislation responsible for the increase in part-time work? Table 11 reports estimates for the impact of an extension in job-protected leave on the proportion of women working full-time, conditional on participating in the labor market. As in Table 10, the rows -1m/+1m (-2m/+2m, ...) compare labor market outcomes of women who give birth 1 month (2 months, ...) before and after the change in maternity leave legislation. The table shows that among women who are working 2 months after childbirth, the fraction of women

Table 11: Maternity Leave Legislation and Full-Time Work

	1st change: 2 months vs 6 months (May 1979)							
	2	6	10	12	18	36	60	96
Working FT, March 78	0.7494	0.7380	0.7144	0.7069	0.6943	0.6544	0.6079	0.5899
-1/+1	**0.0434**	-0.0004	0.0002	0.0077	0.0052	0.0044	0.0058	-0.0026
	(0.0148)	(0.0116)	(0.0091)	(0.0107)	(0.0103)	(0.0115)	(0.0122)	(0.0125)
-1/+1, corrected	**0.0620**	0.0005	0.0003	0.0110	0.0074	0.0063	0.0083	-0.0037
-2/+2	**0.0622**	-0.0086	0.0034	0.0032	0.0049	0.0007	-0.0033	-0.0088
	(0.0138)	(0.0092)	(0.0093)	(0.0089)	(0.0092)	(0.0118)	(0.0112)	(0.0118)
-2/+2, corrected	**0.0651**	0.0090	0.0036	0.0034	0.0052	0.0007	-0.0035	-0.0093
-3/+2	**0.0522**	0.0092	-0.0048	0.0022	-0.0032	-0.0072	0.0077	0.0072
	(0.0138)	(0.0103)	(0.0091)	(0.0079)	(0.0032)	(0.0106)	(0.0132)	(0.0093)
-1 year/+1 year	**0.0479**	*-0.0069*	-0.0031	*-0.0066*	*-0.0091*	*-0.0066*	*-0.0073*	*-0.0094*
	(0.0051)	(0.0031)	(0.0026)	(0.0031)	(0.0028)	(0.0030)	(0.0036)	(0.0037)
	2nd change: 6 months vs 10 months (January 1986)							
	2	6	10	12	18	36	60	96
Working FT, Nov. 85	0.7966	0.6785	0.6701	0.6713	0.6168	0.5942	0.5243	0.5066
-1/+1	*-0.0330*	**0.0272**	-0.0075	-0.0063	-0.00793	-0.0045	-0.0072	-0.0067
	(0.0136)	(0.0129)	(0.0097)	(0.0095)	(0.0099)	(0.0063)	(0.0102)	(0.0101)
-1/+1, corrected	*-0.0470*	**0.0389**	-0.0104	-0.0099	-0.0090	-0.0051	-0.0091	-0.0081
-2/+2	*-0.0511*	**0.0300**	-0.0103	0.0081	-0.0099	0.0004	-0.0082	-0.0072
	(0.0207)	(0.0105)	(0.0073)	(0.0073)	(0.0088)	(0.0099)	(0.0098)	(0.0096)
-2/+2, corrected	*-0.0540*	**0.0351**	-0.0099	0.0091	-0.0100	0.0004	-0.0147	-0.0073
-3/+2	*-0.0652*	**0.0393**	-0.0067	-0.0081	-0.0092	-0.0062	-0.0083	-0.0073
	(0.0201)	(0.0098)	(0.0030)	(0.0069)	(0.0084)	(0.0060)	(0.0094)	(0.0067)
-1 year/+1 year	*-0.0791*	**0.0262**	*-0.0353*	*-0.0240*	*-0.0234*	*-0.0270*	*-0.0271*	*-0.0177*
	(0.0039)	(0.0028)	(0.0021)	(0.0021)	(0.0021)	(0.0024)	(0.0023)	(0.0025)
	6th change: 18 months vs 36 months (January 1992)							
	2	6	10	12	18	36	60	96
Working FT, Nov. 91	0.6828	0.6421	0.6225	0.6309	0.5400	0.4998	0.4564	0.4473
-1/+1	0.0012	0.0120	0.0061	0.0016	**0.0243**	-0.0038	-0.0069	0.0005
	(0.0131)	(0.0136)	(0.0124)	(0.0118)	(0.0096)	(0.0065)	(0.0084)	(0.0078)
-1/+1, corrected	0.0024	0.0172	0.0090	0.0023	**0.0348**	-0.0050	-0.0073	-0.0007
-2/+2	0.0083	0.0070	0.0037	0.0031	**0.0151**	-0.0057	-0.0034	-0.0025
	(0.0191)	(0.0108)	(0.0104)	(0.0099)	(0.0085)	(0.0052)	(0.0080)	(0.0082)
-2/+2, corrected	0.0087	0.0074	0.0053	0.0033	**0.0158**	-0.0058	-0.0035	-0.0026
-3/+2	-0.0016	0.0074	0.0041	0.0023	**0.0251**	0.0030	-0.0087	-0.0007
	(0.0133)	(0.0148)	(0.0134)	(0.0127)	(0.0103)	(0.0048)	(0.0084)	(0.0080)
-1 year/+1 year	-0.0007	0.0010	0.0052	-0.0016	**0.0170**	-0.0010	-0.0040	0.00010
	(0.0060)	(0.0046)	(0.0042)	(0.0041)	(0.0028)	(0.0028)	(0.0028)	(0.0026)

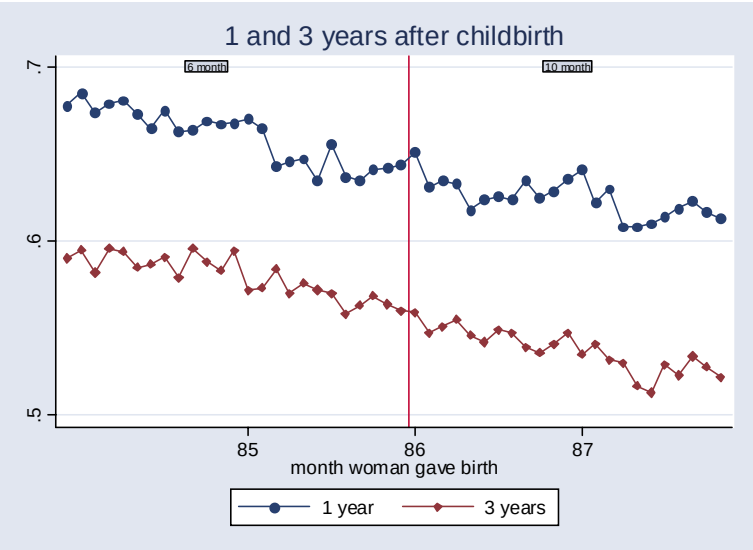
Dependent variable: fraction of women working full-time t months after childbirth, conditional on working. -1m/+1m: 1 month before and after the change in law. -1m/+1m, corrected: -1m/+1m divided by the fraction of women for which birth month is correctly measured (0.698), -2m/+2m: 2 months before and after the change in law. -2m/+2m, corrected: -2/+2 divided by the fraction if women for which birth month is correctly measured or under- or overestimated by one month (0.948). -3/+2: 3 months before and 2 months after the change in law.

working full-time is higher when job-protected leave is 2 months rather than 6 months. It thus seems that women who return to work after 2 months although they were entitled to six months of job-protected leave are women who are very attached to the labor market, and more likely to work full-time. We observe the same pattern for the two other major changes in maternity leave legislation. On the other hand, the extension in job-protected leave from 6 to 10 months in 1986 significantly decreased the probability of working full-time for women who are working 2 months after childbirth. A possible explanation for this finding is that the 1986 maternity leave reform allowed women to combine maternity leave with part-time work at an employer other than the previous one. In Table 17 in Appendix E, we compare the full-time status of women who give birth in April or May (2 vs 6 months) as well as December and January (6 vs 10 months and 18 vs 36 months) in years in which there was no change in maternity leave legislation. We find no significant differences for these women, confirming that these effects are indeed due to the reform in maternity leave legislation. Finally, there is little evidence that the extension in job-protected leave had a long-term impact on full-time work. For 1986 maternity leave reform, most of our estimates show a slight reduction in full-time work. However, none of the coefficients is statistically significant. If, in contrast, we compare women who give birth one year before or one year after the extension in job-protected leave, the fraction of women working full-time 1, 3, or even 8 years after childbirth, conditional on labor force participation, is about 2 percentage points lower after the reform. As Figure 5 nicely illustrates, this appears to be mostly due to a pre-existing time trend, rather than due to the policy reform.

6.1.3 Which Women Are Affected Most by an Extension in Maternity Leave Legislation?

So far, our results referred to women with an apprenticeship degree. In this section, we check whether women without post-secondary education (low) or women with a university degree reacted differently to the policy reforms. We focus on women's decision to postpone their return to work due to an extension in job-protected leave, i.e. the drop in labor supply T_1 months after childbirth when job-protected leave increases from T_1 to T_2 months. Table 12 reports results. All education groups show strong reactions to an extension in job-protected leave. Moreover, for all education groups the drop in labor supply is largest for the increase in job-protected leave from 2 to 6 months, and smallest for the increase from 18 to 36 months. For the first policy reform, women with a high level of education show the strongest, and women with a low level of education the weakest, drop in the participation rate. For the other two reforms, differences between education groups are smaller. Moreover, for these reforms the drop in the participation rate is stronger for the medium than for the highly educated. There is no evidence that the extensions in maternity leave

Figure 5: Fraction of Women Working Full-Time Conditional on Labor Force Participation, by Month Woman Gave Birth



legislation had a long-term impact on female labor supply after childbirth for any education group. The next section discusses our findings.

6.1.4 Interpretation

We find strong evidence that each maternity leave reform induced women to delay their return to work. Is this because maternity benefits are paid for a longer period, or because of an increase in the job guarantee period? The policy reforms in 1979 and 1986 increased the duration mothers are entitled to maternity benefits in tandem with the duration of job-protected leave, making it impossible to disentangle the impact of maternity benefits from that of a job guarantee. The policy reform in 1992, however, only raised the period of job-protected leave, but left the period women are entitled to maternity benefits unchanged. From Figure 1, an unusually high fraction of women return to the labor market exactly when maternity benefits expire -i.e. 18 months after childbirth-, as well as when job-protected leave expires -i.e. 36 months after childbirth. This indicates that women care both about maternity benefits and a job guarantee. Note that women value a job guarantee only if it is difficult or costly to find a job which they like as much as their previous one. There are several reasons for why that may be the case, including firm-specific human capital accumulation, on-the-job search, and uncertain job finding rates.

We also find that the response to an expansion in job-protected leave varies by education.

Table 12: Maternity Leave Legislation and Labor Force Participation: Results by Education

	B: low		
	2 months vs 6 months	6 months vs 10 months	18 months vs 3 years
Prop. working	0.414	0.4734	0.3654
-1/+1	**-0.1897 (0.0132)**	**-0.1792 (0.0142)**	**-0.0576 (0.0129)**
-1/+1, corrected	**-0.2718**	**-0.2567**	**-0.0825**
-2/+2	**-0.2693 (0.0130)**	**-0.2241 (0.0146)**	**-0.0718 (0.0096)**
-2/+2, corrected	**-0.2835**	**-0.2359**	**-0.0756**
-3/+2	**-0.2809** (0.0136)	**-0.2511** (0.0139)	**-0.0836** (0.0134)
	A: medium		
	2 months vs 6 months	6 months vs 10 months	18 months vs 3 years
Prop. working	0.4219	0.4274	0.3591
-1/+1	**-0.2412 (0.0072)**	**-0.1932 (0.0062)**	**-0.0790 (0.0049)**
-1/+1, corrected	**-0.3455**	**-0.2767**	**-0.1131**
-2/+2	**-0.3429 (0.0068)**	**-0.2418 (0.0064)**	**-0.0987 (0.0052)**
-2/+2, corrected	**-0.3618**	**-0.2554**	**-0.1032**
-3/+2	**-0.3611** (0.0069)	**-0.2715** (0.0058)	**-0.0966** (0.0051)
	C: high		
	2 months vs 6 months	6 months vs 10 months	18 months vs 3 years
Prop. working	0.5579	0.5514	0.4745
-1/+1	**-0.2813 (0.0337)**	**-0.1448 (0.0302)**	**-0.0500 (0.0221)**
-1/+1, corrected	**-0.4030**	**-0.2070**	**-0.0716**
-2/+2	**-0.3860 (0.0338)**	**-0.1796 (0.0307)**	**-0.0782 (0.0216)**
-2/+2, corrected	**-0.4063**	**-0.1890**	**-0.0823**
-3/+2	**-0.4316** (0.0327)	**-0.2099** (0.0286)	**-0.0780** (0.0222)

Dependent variable: fraction of women working full-time t months after childbirth, conditional on working. -1m/+1m: 1 month before and after the change in law. -1m/+1m, corrected: -1m/+1m divided by the fraction of women for which birth month is correctly measured (0.698), -2m/+2m: 2 months before and after the change in law. -2m/+2m, corrected: -2/+2 divided by the fraction if women for which birth month is correctly measured or under- or overestimated by one month (0.948). -3/+2: 3 months before and 2 months after the change in law. The proportion of women working refers to the proportion of women who gave birth in March 1979 and are working 2 months after childbirth (1st change), the proportion of women who gave birth in November 1985 and are working 6 months after childbirth (2nd change), and the proportion of women who gave birth in November 1992 and are working 18 months after childbirth (3rd change).

For the increase in job-protected leave from 2 to 6 months, women with a university degree show the biggest drop in labor supply 2 months after childbirth. For the more generous extensions, in contrast, highly educated women show the weakest respsonse. These extensions thus appear to be less binding for women with a university degree, possibly because many prefer to return to the labor market earlier.

A third important result is that the maternity leave reforms had no long-term impact on women's labor supply after childbirth, both at the extensive and intensive margin. That is, 3 years after childbirth or later, labor force participation rates as well as full-time work, conditional on participating in the labor market, are similar before and after the reform. In the data, there is strong evidence that women who return to the labor market later are more likely to work part-time. For instance, among women who gave birth in November 1985 and were working 2 months after childbirth, 79.85 % were working full-time. Among women who were working 8 years after childbirth, however, this proportion was only 50.66 % (see Table 11). There are two interpretations of this finding. The first one is selection: Women who return to the labor market later are less attached to the labor market and more likely to work part-time. Alternatively, more time at home with their children may cause women to work less, once they decide to return to the labor market. Our results suggest that the correlation between time spent at home and working full-time is mostly driven by selection, and is not causal.

From a theoretical point of view, it is ambiguous whether an extension in maternity leave legislation increases or decreases labor supply in the long-run. One argument for why an extension in job-protected leave may increase labor force participation rates in the long-run is the following. Suppose a mother chooses not to return to her *previous* employer T_1 periods after childbirth, but would return T_2 periods after childbirth. This woman works T_2 periods after childbirth when she is entitled to T_2 periods of leave, but not necessarily when she is entitled to only T_1 periods of leave and does not have the option to return to her previous employer at T_2. This is because she may not have found a job she likes as much as her previous job. On the other hand, there are arguments why an extension in job-protected leave may reduce participation rates in the long-run. First, a delay in the return to work may decrease women's value of human capital, which in turn may increase the probability that a woman drops out of the labor market, or that she works part-time if she returns to the labor market. Second, more time at home may increase the mother's preferences for remaining at home with her children, which again might reduce the probability that she will return to the labor market. One interpretation of our finding of no long-term impact of an expansion in maternity leave is that neither of these arguments play much of a role. Alternatively, the effects that predict an increase or decrease in labor supply are both at work, and roughly offset each other. The next section analyzes the impact of the expansion in maternity leave on women's

wages, and thus sheds more light on the importance of human capital depreciation.

6.2 Maternity leave and earnings

This section analyzes the impact of an expansion in maternity leave on women's earnings. There are several reasons for why maternity leave affects earnings. The most important channel is probably through human capital accumulation. An expansion in maternity leave induces women to postpone their return to work; hence, women have less time to accumulate labor market skills and may lose more labor market skills while at home with their children. Maternity leave legislation may also affect women's probability to return to their pre-birth employer or pre-birth occupation, thus affecting the probability that they retain their firm- or occupation-specific human capital. Moreover, the maternity leave policy may affect the number of hours women work after they return to the labor market. We believe that this is unlikely to be the case since we find little evidence that the expansions in job-protected leave affected part-time work in the long-run. It may still be argued that maternity leave legislation affects hours worked, conditional on full-time or part-time work. In our data, we only observe women's average daily wage (as opposed to their hourly wage rate), as well as their full- or part-time status. A change in the daily wage due to a change in maternity leave legislation could therefore be driven by either a change in the hourly wage or a change in the number of hours worked. From Section 4, actual hours worked are similar for women with and without children, conditional on working full- or part-time Hence, any difference between wages before and after child birth -conditional on working full- or part-time- are likely to be mostly due to differences in hourly wages, rather than due to differences in hours worked. Finally, maternity leave legislation may affect the type of women who return to work, thus affecting earnings through selection. Since we find little evidence that an increase in maternity leave affects mothers' labor force participation rates in the long-run, we believe that this is unlikely to be the case.

A first glance at the data shows that time away from the labor market after childbirth is a strong predictor for future wages. Table illustrates how time at home affects the 'family wage gap'. Panel A defines the family wage gap as the difference between the (log) wage after the women returns to the labor market and the pre-birth (log) wage, while panel B defines it as the difference between the (log) wage 8 years after childbirth and the pre-birth (log) wage. We restrict the analysis to women who are employed 8 years after childbirth. Women who return to work within 2 months after childbirth experience no wage loss when returning to the labor market (Panel A). Women returning within 2 and 6 months after childbirth, in contrast, earn a 10 % lower wage per day after childbirth than before. The wage loss increases to 22 % for women who return to work within 6 and 10 months after childbirth, and to 52 % for women who stay at home more than

three years. If we restrict the analysis to women who work full-time before and after childbirth and return to their pre-birth employer (Panel A, Column 2), the impact of time at home on the wage gap is smaller, but still substantial. Results are similar if we look at the difference between the wage at years after childbirth and the pre-birth wage (Panel B). Is the strong effect of time at home on the family wage gap causal, or due to selection? Evaluating the impact of an expansion in job-protected leave on women's wages helps to shed new light on this question.

Unlike our employment data, which refers to a point in time, our wage data refers to a time

Table 13: Time at Home and the Family Wage Gap

	Panel A		Panel B	
	1	2	1	2
base category: $\leq$ 2 months	0.0031 (0.0105)	0.0444 (0.0076)	0.0442 (0.0108)	0.1461 (0.0137)
2 $<$ months $\leq$ 6	-0.1067 (0.0126)	-0.0756 (0.0092)	-0.0898 (0.0129)	-0.0504 (0.0169)
6 $<$ months $\leq$ 10	-0.2228 (0.0143)	-0.1215 (0.0111)	-0.1468 (0.0146)	-0.0981 (0.0169)
10 $<$ months $\leq$ 18	-0.3333 (0.0136)	-0.2020 (0.0113)	-0.2251 (0.0138)	-0.1449 (0.0209)
18 $<$ months $\leq$ 36	-0.4639 (0.0144)	-0.3145 (0.0159)	-0.2580 (0.0146)	-0.2056 (0.0273)
$>$ 36 months	-0.5231 (0.0126)	-0.4077 (0.0177)	-0.3909 (0.0133)	-0.3198 (0.0266)

Dependent variable, Panel A: Difference between the (log) wage after returning to the labor market and pre-birth (log) wage. Panel B: Difference between the (log) wage 8 years after childbirth and pre-birth (log) wage. Column 1: All women who are employed 8 years after childbirth. Column 2, Panel A: Women who are employed 8 years after childbirth and return to work full-time to their pre-birth employer. Column 2, Panel B: Women who are employed full-time at their pre-birth employer 8 years after childbirth. Robust standard errors in parentheses. Results refer to a 2 percent random sample of our data.

spell - see Section 4 for details. In Table 4, we first compare average daily wages for women who give birth one month before and after the change in law (row -1m/+1m). Here, it is important to bear in mind that, due to the way wage information is collected, women who give birth one month after the change law typically have one less month of experience after childbirth than women who give birth one month after the change in the law. Second, we compare wages of women who give birth up to three months before and after the change in law (-(1 to 3m)/+(1 to 3m)). Here, it is even more of a problem that women who give birth after the change in law on average have less experience after childbirth than women who give birth before the change. For this reason, we also report diffierence-in-difference estimates, using women who give birth during the same months in a year in which there was no change in maternity leave legislation as a control group. For instance, the control groups for the first change, which occured in May 1979, are women who give birth between February and July 1978 and 1980. All methods give similar results. The first two expansions in maternity leave lowered wages after childbirth by almost 2 percentage points - even 8 years after childbirth. The increase in maternity leave from 18 to 36 months had no impact on wages 1 year after childbirth, and increased wages 2 years after childbirth. This is likely to be a selection effect: Women who work 2 years after childbirth although they are eligible to 3

years of leave are likely to have a higher earning power than women who are eligible to only 18 months of leave. This is also consistent with our findings in Table 11 on full-time work. Three years after childbirth or later, the expansion from 18 to 36 months of leave also lowered wages, but by a smaller amount than the previous expansions. This is not surprising since the last policy reform had a smaller impact on women's decision to return to the labor market - see Table 10. Note that for the last change, differences between wages before and after the reform are not always statistically significant.

These results indicate that time away from the labor market has a strong negative and *causal* impact on women's post-birth wages. In a future version of the paper, we intend to explore the impact of the expansions in maternity leave on the probability that a woman is employed with her pre-birth employer and occupation. We also intend to analyze to which extent this can explain the lower post-birth wages after the policy reforms.

7 Conclusion

This paper evaluates the impact of several expansions in job-protected leave on women's labor market outcomes after childbirth. We estimate the causal impact of the policy reform by comparing labor market outcomes of women who give birth shortly before and after the change in the law. We find strong evidence that each expansion in maternity leave induced women to delay their return to work. The delay is strongest for the increase in job-protected leave from 2 to 6 months, and weakest for the increase from 18 to 36 months. The response to the expansions in job-protected leave has not been uniform across education groups. Highly educated women show the strongest response for the increase in maternity leave from 2 to 6 months, but the weakest response for the increase from 18 to 36 months. Moreover, we find little evidence that the expansions in maternity leave had an impact on labor supply in the long-run, neither at the extensive nor at the intensive margin: Three years after childbirth or later, the fraction of women working as well as the fraction of women working full-time, conditional on participating in the labor market, is roughly the same before and after the reform. Most importantly, we find that each maternity leave reform, in particular the increase from 6 to 10 months, reduced women's earnings, even 8 years after childbirth. This indicates that more time out of the labor market has long-lasting negative consequences on women's career prospects.

This paper left several interesting aspects of maternity leave legislation unexplored. Maybe most importantly, maternity leave legislation may benefit children. In fact, this was the main motivation behind the policy reforms in Germany. It was argued that the expansions in job-protected leave give women the opportunity to spend more time with their children after childbirth, which was thought

Table 14: Maternity Leave Legislation and Wages

	1st change: 2 vs 6 months				
	12	24	36	60	96
earnings, March 79	4.34	4.34	4.35	4.35	4.36
-1m/+1m	-0.0153	-0.0168	-0.0167	-0.01300	-0.0168
	(0.0094)	(0.0093)	(0.0095)	(0.0090)	(0.0090)
-1m/+1m, corrected	-0.0219	-0.0241	-0.0239	-0.0186	-0.0241
-(1 to 3m)/+(1 to 3m)	-0.0253	-0.0301	-0.0261	-0.2003	-0.0225
	(0.0052)	(0.0055)	(0.0056)	(0.0050)	(0.0052)
D in D 1	-0.0200	-0.0168	-0.0150	-0.0157	-0.0161
	(0.0061)	(0.0061)	(0.0059)	(0.0059)	(0.0061)
D in D 2	-0.0193	-0.0152	-0.0162	-0.0134	-0.0153
	(0.0060)	(0.0059)	(0.0061)	(0.0059)	(0.0062)
	2nd change: 6 vs 10 months				
	12	24	36	60	96
Earnings, Nov. 85	4.37	4.37	4.38	4.38	4.38
-1m/+1m	-0.0153	-0.0165	-0.0178	-0.0176	-0.0159
	(0.0099)	(0.0098)	(0.0096)	(0.0095)	(0.0096)
-1/+1, corrected	-0.0219	-0.0236	-0.0255	-0.0252	-0.0228
-(1 to 3m)/+(1 to 3m)	-0.0300	-0.0254	-0.0200	-0.0210	-0.0159
	(0.0050)	(0.0049)	(0.0048)	(0.0049)	(0.0051)
D in D 1	-0.0200	-0.0156	-0.0161	-0.0159	-0.0171
	(0.0062)	(0.0064)	(0.0065)	(0.0063)	(0.0064)
D in D 2	-0.0199	-0.0143	-0.0182	-0.0173	-0.0165
	(0.0065)	(0.0063)	(0.0063)	(0.0064)	(0.0066)
	6th change: 18 vs 36 months				
	12	24	36	60	96
Earnings, Nov. 91	4.46	4.39	4.40	4.41	4.40
-1m/+1m	0.0031	0.0241	-0.0100	-0.0085	-0.0099
	(0.0097)	(0.0095)	(0.0090)	(0.0095)	(0.0095)
-1m/+1m, corrected	0.0044	0.0345	-0.0143	-0.0121	-0.0144
-(1 to 3m)/+(1 to 3m)	-0.0034	0.0199	-0.0153	-0.0156	-0.0164
	(0.0048)	(0.0051)	(0.0052)	(0.0050)	(0.0051)
D in D 1	0.0021	0.0211	-0.0100	-0.0095	-0.0088
	(0.0065)	(0.0064)	(0.0065)	(0.0065)	(0.0062)

Dependent variable: Average daily wage. Women who are employed t periods after childbirth only. -1m/+1m: Women who give birth one month before the change in law versus women who give birth one month after the change in law. -1m/+1m:, corrected: -1m/+1m divided by the fraction of women whose birth month is correctly measured (0.698). -(1 to 3 m)/+(1 to 3 m): Women who give birth 1 to 3 months before the change in law versus women who give birth 1 to 3 months after the change in law. DinD 1: difference in difference estimate; control group: 1 year before the change in law. DinD 2: difference in difference estimate; control group: 1 year after the change in law.

to be beneficial for children's development. Second, maternity leave legislation may affect labor market outcomes of young women without children. If it is costly for firms to provide extended coverage, they may shift these costs to women by offering them lower wages. Firms may also respond by hiring men rather than women. On the other hand, a more generous leave policy may increase the probability that young women to participate in the labor market before childbirth. Finally, maternity leave legislation may affect women's decision whether to have a child. It may also affect the spacing of births; for instance, women may have the second child shortly after the first when maternity leave is between 12 and 18 months, but wait longer when maternity leave is 3 years[20].

8 Appendix

Appendix A: Data description and sample selection

Main Data: BLH Our main data comes from Social Security Records (the so-called Beschäftigten - Leistungsempfänger - Historik, BLH). The data is available from 1975 to 2001. It allows us to construct the complete work history -including time spent in unemployment and on leave of absence- for *every* woman covered by the social security system. In particular, we know the exact day a woman started and stopped working, switched employers, became unemployed, or went on leave. For each employed woman, we observe at least one wage per year. If the woman switched employers during the year, we observe more than one wage. As with many administrative data sets, wages are top coded at the highest level of earnings that are subject to social security contributions. This is not a serious problem in our data, since for apprentices, less than 1 % of pre- and post-birth wages are right-censored[21].

From this data base, we select all spells of all women with at least one leave spell between January 1978 and December 1992 ($2 \leq$ btyp $\leq .6$). We drop all women who are at least once classified as a foreigner (staat_schl ≥ 1 or nat_kto ≥ 1) and women with at least one spell in East Germany (ow_knz=2 or ow_kto=2). We then drop all dual jobs (level ≥ 1), and all working spells (btyp=1 and stib $\neq 0$) with reported wages lower than the censoring limit for which social security contributions have to be paid. After that, we impose the following restrictions on leave spells:

- the leave spell must not start on the first of a month;

- the leave spell must last at least 2 months;

[20] Lalive and Zwiemüller (2005) analyze the impact of a policy reform in Austria on women's fertility behavior.

[21] For women with a university degree, the proportion of censored observations is higher, but still less than 5 %.

- the woman must be younger than 45 when leave started;

- the leave spell must not be preceded by a spell in apprenticeship training;

- the leave spell must not be preceded by a spell in unemployment.

For each leave spell, we then compute a number of variables, such as wages and employment status, before and after birth. See the next section for a precise definition of these variables. After these variables have been computed, we keep one observation per leave. Unless otherwise noted, our results refer to women with an apprenticeship degree.

Pension Register The Pension Register is a 1 % random sample drawn from the data base described above. This data has the exact same structure as our main data, except that it additionally includes the birth year and birth month of each child. This data is principally available from 1975 to 1995. However, reliable data on the fertility history exists only from 1986 onwards. Before 1986, we observe child births only if the mother voluntarily reports the birth to the pension register. After 1986, on the other hand, local birth registers automatically report all births to the pension register. Since the number of births is more than twice as high after 1986 than before, we discard all observations before 1986 (with the exception of sample 2). From this data base we create three samples.

- *Sample 1:* Our first sample consists of all women with at least one leave spell ($2 \leq$ btyp $\leq .6$) between January 1986 and December 1992. We drop leave spells that are shorter than 2 months, leave spells where the woman was older than 45, leave spells that were preceded by a spell in registered unemployment, and leave spells during apprenticeship training. We use this data to analyze how many leave spells are due to child birth (see table **??**).

- *Sample 2:* For the second sample, we select all women who have given birth between January 1986 and December 1992. We use this sample to analyze how many women who give birth take maternity leave (see table 7)

- *Sample 3:* Our third sample includes of all women who give birth between January 1986 and December 1992 (excluding births based on the ZU_VDR variable) and go on maternity leave. To make this sample as similar as possible to our main sample, we impose the same restrictions on this sample. We use this sample to analyze the relationship between the month a woman goes on maternity leave and the month she gives birth (see table 3).

Unless otherwise noted, our results refer to women with an apprenticeship degree.

Microcensus The German microcensus is a survey of 1 % randomly selected households, conducted by the German Federal Statistical Office. In terms of data collection and methods applied, it is comparable to the Current Population Survey in the US. In every year, about 370000 households with 820000 individuals participate in the survey. The survey has been conducted since 1957. Since 1991, households in the former East Germany are included in the survey. However, individual data is publicly available in the form of scientific use files for the years 1989, 1991, and 1993 to 2002[22]. A scientific use file contains randomly drawn 70 % of the households in the original data. From this data base we select all West German women who are between 20 and 40 years old and whose highest degree completed as an apprenticeship degree. Our sample may thus include women who are currently in education.

Appendix B: Variable definitions

Main Data: BLH

- *apprentices* Women with less than 3/10 of spells as university graduates (bild=5 or bild=6), and at least 3/10 of spells as apprentices (bild=2 or bild=4).

- *number of leave spells* We use the btyp variable ($2 \leq$ btyp $\leq .6$) to identify leave spells. One leave spell is often followed by another leave spell. We consider these subsequent leave spells as one leave spell. In some rare cases, a leave spell is followed by a short working spell, which is followed by another leave spell. If the difference between the starting dates of the two leave spells is less than 9 months, we consider the two leave spells as one spell. If the difference is greater than 9 months, we consider them as two leave spells.

- *return to work:* A woman is considered to have returned to work after childbirth if she returns to work for at least two consecutive months. We impose this restriction because up to 5 % of women return to work for less than two months, typically right when job-protected leave expires. Many of these women take up permanent employment only many years later. Results are similar if a more stringent definition, such as working for at least six consecutive months, is used.

- *working t months after childbirth:* A woman is considered as working t months after childbirth if at $t-1$, t, or $t+1$, the btyp variable is equal to 1, and the woman has returned to work. *Women on so-called marginal jobs, i.e. less than 15 hours per week, are not considered as working.* According to this definition, a woman is working 6 months after child birth if she worked at either the 5th, 6th, or 7th month after giving birth. We find it convenient to define

[22] I would like to thank IZA for offering me the opportunity to work with the data.

the variable in this way because in about 30 % of the cases, we over- or underestimate the child's birth month by one month.

- *working full-time t months after childbirth:* A woman is considered as working t months after childbirth if at $t-1$, t, or $t+1$, the btyp variable is equal to 1, the stib variable is smaller than 6 (no part time), and the woman has returned to work.
- *wages t months after child birth, working women only:* We deflate wages using the Consumer Price Index, using 2002 as the base year.
- *wages t months after child birth, all women:* Women who are not employed t months after child birth are assigned a wage of zero.
- *Pre-birth characteristics (age, wage, working full-time, occupation):* Pre-birth characteristics refer to 9 months before childbirth, i.e. around the time the child was conceived. A small fraction of women in our sample (about 2 %) was not employed 9 months before giving birth. For these women, pre-birth characteristics refer to the last working spell before the mother went on leave.

Pension Register

- We define all variables listed in the previous section in the same way.
- *maternity leave:* A woman who has given birth takes maternity leave if in the period 6 months before and 3 months after the child's birthday, the btyp variable takes a value between 2 and 6 at least once. We have experimented with more generous as well as tighter definitions (e.g. up to 9 months or only 3 months before the child's birthday). Alternative definitions have little effect on our results.
- *childbirth:* The pension register records the year and birth month of (almost) all children born after December 1985. There is an additional variable in the data set that indicates whether a woman is eligible for a pension because of child birth (ZU_VDR). In some rare cases, a woman has given birth according to the ZU_VDR variable, but there is no recorded birth. In table **??**, a leave spell is considered as a true maternity leave spell if a birth (including births based on the ZU_VDR variable) is recorded 3 months before or 6 months after the start of the leave spell. Again, we have experimented with more generous and tighter definitions. Alternative definitions have little effect on our results.

Microcensus

- *apprentices:* Women who completed an apprenticeship or equivalent.

- *working:* A woman is considered as working if in the survey week, she reported to be regularly employed, and her actual working hours in the survey week was greater than 0 or 20, respectively. We require women to have non-zero working hours because some women on maternity leave report to be regularly employed with 0 working hours. We imposed the tighter restriction of at least 20 working hours in order to approximate employment relationships for which social security contributions have to be paid.
- *part-time work:* self-reported; typically usual working hours less than 35.
- *number of children:* based on the number of children in the household. A child is assigned to its parents using the family identification and the variable that specifies the individual's relationship to the head of household.

C: Dropped vs Included True Maternity Leave Spells: Evidence from the Pension Register

Do true leave spells that start at the first of a month differ from true leave spells that start at another day? Table 15 reports results.

Table 15: Comparison between (true) leave spells that start on the first of a month and those that don't

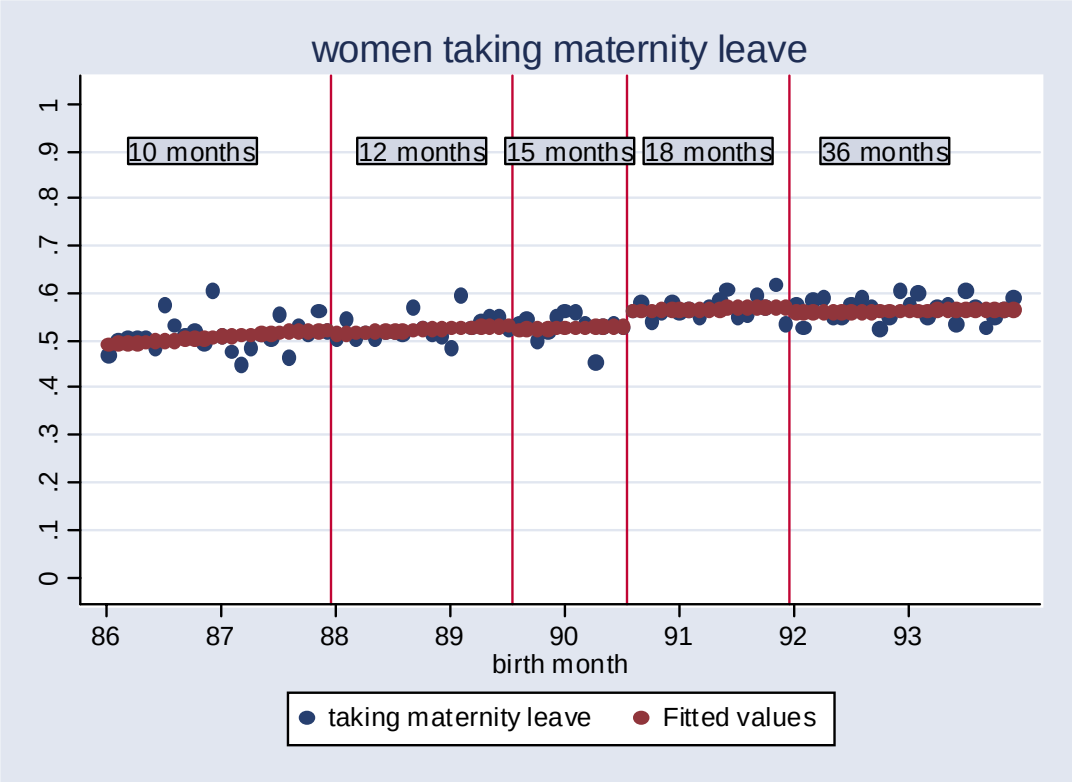
	included leave spells	difference dropped leave spells	p-value
Proportion working			
2 months	0.0551 (0.0020)	-0.0113 (0.0077)	0.139
6 months	0.1035 (0.0027)	0.0042 (0.0103)	0.681
12 months	0.2557 (0.0038)	-0.0028 (0.0148)	0.852
24 months	0.3887 (0.0043)	-0.0131 (0.0165)	0.428

Data: German Pension Register. N=14023. Sample: Mothers that go on maternity leave (sample 3). The first column shows the proportion of women working 2, 6, 12 and 24 months after child birth, for women whose leave spell did not start at the first of a month (included leave spells). The second column shows the difference for women whose leave spell started at the first of a month (dropped leave spells).

D: Extension in Job-Protected Leave and Incidence of Leave Taking

Figure 6 plots the fraction of mothers who take maternity leave by birth months. The blue dots refer to the average fraction of women who give birth in a certain month and take maternity leave;

Figure 6: Incidence of Leave Taking



the red line are predicted averages fitting a quadratic time trend. The red vertical lines indicate an extension in job-protected leave. While the fraction of mothers on leave varies substantially by birth months, there is little evidence for a discontinuous jump when maternity leave was extended, except possibly for the increase in job-protected leave from 15 to 18 months. However, this jump is not statitistically significant, and disappears if we allow for polynomial time trends of higher order.

Table 16 reports results from linear probability models that control for a time trend in various

Table 16: Maternity leave legislation and the incidence of leave taking

	1	2	3	4
10 vs 12 months	0.0010 (0.0136)	-0.0055 (0.0161)	-0.0073 (0.0167)	-0.0057 (0.0195)
12 vs 15 months	-0.0061 (0.0206)	-0.0139 (0.0231)	-0.0207 (0.0280)	-0.0185 (0.0317)
15 vs 18 months	0.0256 (0.0266)	0.0194 (0.0279)	0.0078 (0.0387)	0.0089 (0.0395)
18 vs 36 months	0.0098 (0.0358)	0.0103 (0.0361)	-0.0029 (0.0473)	-0.0036 (0.0477)

Data: German Pension Register. N=14023 (around 150 observations per month). Sample: Women who have given birth (sample 1). Dependent variable: 1 if women takes maternity leave, 0 otherwise. Linear probability models. Column 1 controls for a linear, column 2 for a quadratic, column 3 for triple, and column 4 for a quartic time trend.

ways. Each regression allows for a separate discontinuous jump whenever maternity leave was extended. The results indicate that there is no significant change in the incidence in leave taking following an extension in job-protected leave.

E: Robustness Checks

Table 17 compares the fraction of women working full-time in months when there was no change in maternity leave legislation. We find no significant differences, indicating that any differences in years in which there was a policy reform are indeed due to the policy reform.

Table 17: Are There Significant Differences in the Fraction of Women Working Full-Time when Maternity Leave Legislation Did Not Change?

	2	6	10	12	18	36	60	96
April/May 78	-0.0003	-0.0003	0.0039	-0.0010	-0.0014	-0.0101	-0.0008	0.0098
	(0.0113)	(0.0099)	(0.0101)	(0.0101)	(0.0102)	(0.0099)	(0.0110)	(0.0111)
March/June 78	0.0105	0.0097	0.0067	-0.0016	-0.0098	0.0103	-0.0080	0.0001
	(0.0099)	(0.0100)	(0.0100)	(0.0101)	(0.0099)	(0.0097)	(0.0098)	(0.0101)
April/May 80	0.0084	-0.0108	-0.0089	-0.0118	-0.0102	0.0020	0.0059	-0.0025
	(0.0097)	(0.0101)	(0.0099)	(0.0098)	(0.0097)	(0.0110)	(0.0097)	(0.0099)
March/June 80	-0.0102	0.0030	-0.0075	0.0039	0.0032	-0.0043	0.0105	0.0085
	(0.0100)	(0.0103)	(0.0097)	(0.0099)	(0.0098)	(0.0113)	(0.0098)	(0.0099)
Dec./Jan. 84/85	0.0083	0.0021	-0.0025	0.0003	0.0030	0.0101	0.0102	-0.0034
	(0.0096)	(0.0099)	(0.0098)	(0.0100)	(0.0100)	(0.0112)	(0.0095)	(0.0110)
Nov./Feb. 84/85	0.0026	-0.0020	-0.0030	0.0105	0.0052	-0.0085	-0.0110	0.0057
	(0.0087)	(0.0102)	(0.0099)	(0.0103)	(0.0099)	(0.0110)	(0.0100)	(0.0109)
Dec./Jan. 86/87	0.0032	-0.0103	0.0037	0.0010	0.0084	0.0103	0.0020	0.0024
	(0.0089)	(0.0103)	(0.0103)	(0.0103)	(0.0101)	(0.0097)	(0.0100)	(0.0987)
Nov./Feb. 86/87	0.0101	-0.0062	-0.0100	-0.0105	0.0030	-0.0085	-0.0020	-0.0051
	(0.0092)	(0.0111)	(0.0101)	(0.0101)	(0.0101)	(0.0099)	(0.0099)	(0.0099)
Dec./Jan. 90/91	-0.0042	-0.0090	0.0047	0.0016	0.0064	-0.0072	0.0104	0.0098
	(0.0100)	(0.0110)	(0.0099)	(0.0100)	(0.0098)	(0.0097)	(0.0098)	(0.0113)
Nov./Feb. 90/91	-0.0081	-0.0020	-0.0101	0.0128	-0.0089	0.0020	-0.0080	0.0112
	(0.0101)	(0.0097)	(0.0092)	(0.0101)	(0.0099)	(0.0987)	(0.0100)	(0.0112)

Dependent variable: fraction of women working full-time t months after childbirth, conditional on working., conditional on working.

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