# Expansions in Maternity Leave Coverage and Mothers' Labor Market Outcomes after Childbirth

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This article analyzes the impact of five major expansions in maternity leave coverage in Germany on mothers' labor market outcomes after childbirth. To identify the causal impact of the reforms, we use a difference-in-difference design that compares labor market outcomes of mothers who give birth shortly before and shortly after a change in maternity leave legislation in years of policy changes and years when no changes have taken place. Each expansion in leave coverage reduced mothers' postbirth employment rates in the short run. The longer-run effects of the expansions on mothers' postbirth labor market outcomes are, however, small.

## I. Introduction

At present, almost every country has provisions for maternity leave allowing mothers to leave their workplace for a limited time around childbirth and giving them the right to return to their previous employer afterward. However, these provisions vary widely across countries. Since the introduction of the Family and Medical Leave Act (FMLA) in 1993, roughly 60% of women in the United States are entitled to 12 weeks of unpaid maternity leave. In Germany, in contrast, women are currently

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eligible for 3 years of partially paid leave. There is a recent trend toward an expansion in leave coverage. For instance, Canada increased paid family leave from about 25 weeks to 50 weeks in 2000. In 2004, California strengthened maternity rights, allowing for up to 6 months of maternity leave. Other countries that have recently extended their leave coverage include the United Kingdom (2003, 2007) and Denmark (2002).[1]

Despite the widespread prevalence of parental leave policies, their economic impact is not fully understood. Proponents argue that these policies promote gender equality and increase women's earnings as they allow mothers to retain valuable firm- or occupation-specific human capital and match-specific search capital after childbirth. Proponents further argue that leave policies improve the mother's health and the child's welfare, through a reduction in early maternal employment. Opponents counter that leave policies may worsen women's position in the labor market, for at least two reasons. First, more time away from work after childbirth could in fact lower women's future labor market attachment and wages because of human capital depreciation while away from work.[2] Second, expansions in maternity leave coverage may make it more costly for employers to hire women of childbearing age relative to men. Employers may respond by hiring fewer women or by lowering their wages.[3]

This article investigates the impact on women's labor market outcomes after childbirth of five major expansions in maternity leave coverage in Germany. The policy reforms differ with respect to the expansion of the job protection period relative to that of the maternity benefit period. The overall goal of the reforms was to facilitate the compatibility of family and career. The reforms were explicitly aimed at encouraging mothers to spend more time with their infants after childbirth, a time that is crucial for the child's development. A further goal of the reforms was to strengthen the long-term position of mothers in the labor market by making it easier for them to reenter the labor market after childbirth.

[1] See Ray (2008) for documentation of parental leave policies in countries in the Organization for Economic Cooperation and Development.

[2] See, e.g., Albrecht et al. (1999), Anderson, Binder, and Krause (2002), and Spivey (2005) for an empirical analysis on the effects of career interruptions due to childbirth on women's postbirth wages. Ejrnaes and Kunze (2013) provide a similar analysis for Germany, exploiting arguably exogenous variation in time away from work induced by the expansions in parental leave to estimate the human capital depreciation rate.

[3] Ruhm (1998) analyzes these effects by exploiting variation in maternity leave coverage across time and across nine European countries (see also Ruhm and Teague 1997). He concludes that more generous leave policies are associated with increased employment but with lower wages of women relative to men. Gruber (1994) studies the impact of mandates that increased employers' relative costs of insuring women of childbearing age. He finds that employers are able to shift much of these costs to the wages of women.

The German context provides us with a unique opportunity to evaluate the effects of parental leave policies on mothers' postbirth careers. First, we are able to investigate a series of policy changes as opposed to a single, specific reform. This allows us to isolate the impact of a job guarantee from that of maternity benefit payments and to assess whether extensions of a short leave period (like reform 1, which increased the job protection and maternity benefit period from 2 to 6 months after childbirth) affect mothers' postbirth labor market outcomes differently from extensions of, by international standards, a long leave period (like reform 4, which increased the job protection period from 18 to 36 months and left the maternity benefit period unchanged at 18 months after childbirth).

Second, since we observe the entire work history of all mothers who ever signed up for maternity leave, we are able to identify the causal effect of the reforms in a clean way by comparing postbirth labor market outcomes of mothers who give birth shortly before or shortly after (3 months in our baseline specification) a change in maternity leave legislation.[4] In order to disentangle the effect of the policy reforms from possible seasonal effects, we use as a control group mothers who give birth in the same months but in years in which no reform took place.

A similar analysis is not possible using policy variation for the United States because, in contrast to Germany, there was only one federal reform (the 1993 FMLA), which entitles roughly 60% of mothers to 12 weeks of unpaid maternity leave.[5] A similar analysis is not possible either for most other countries that have recently expanded maternity leave coverage (such as Canada) because reforms have not been as numerous or because data are of lower quality than in Germany.[6] The paper most closely related to ours, Lalive et al. (2011), evaluates the effects of three reforms in maternity leave coverage in Austria on mothers' postbirth labor market ca-

[4] An earlier study by Ondrich, Spiess, and Yang (2003) and Ondrich et al. (2003) evaluates the impact of the post-1986 expansions in leave coverage on mothers' postbirth outcomes using the German Socioeconomic Panel. However, their sample is too small to permit this identification strategy. Several papers, including Waldfogel (1998), Higuchi, Waldfolgel, and Abe (1999), Berger and Waldfogel (2004), and Hashimoto et al. (2004), examine the effect of maternity leave coverage that is provided voluntarily by employers as opposed to maternity leave coverage that is mandated by the government. This approach may not uncover the causal impact of maternity leave coverage on women's postbirth careers as women may self-select into jobs that provide generous maternity leave coverage. Hashimoto et al. show that this selection into jobs that provide leave coverage is important.

[5] Studies that evaluate the impact of the FMLA on women's postbirth labor market outcomes include Klerman and Leibowitz (1997, 1999), Waldfogel (1999), and Baum (2003a, 2003b). While there is some evidence that the reform induced some women to postpone their return to work, there is little evidence that the reform affected mothers' employment rates or wages in the long run.

[6] For instance, Baker and Milligan (2008a) evaluate a wide range of expansions in leave coverage in Canada. However, their identification strategy relies on much

reers, using an identification strategy similar to ours. All three reforms affected the job protection or maternity benefit period after the child's first birthday. Unlike us, Lalive et al. are therefore not able to investigate expansions in leave coverage before the child's first birthday.

Our main findings can be summarized as follows. Each expansion in maternity leave coverage induced some women to delay their return to work. Hence, the reforms succeeded in increasing the time mothers spend at home with their infants after childbirth, which was an important goal of the reforms. The impact of the reforms on overall maternal employment is, however, small. For instance, reform 2—which increased the job protection and maternity benefit period by 4 months—led to a reduction in maternal employment through the first 6 years after childbirth of only about 1 month. Reform 3—which extended the maternity benefit period from 6 to 22 months and the job protection period from 6 to 10 months after childbirth—had the strongest impact on maternal employment and lowered maternal employment through the first 6 years after childbirth by almost 3 months.

With regard to the long-run effects of the expansions in leave coverage, four out of the five expansions in leave coverage had almost no impact on mothers' employment rates and labor market income 3–6 years after childbirth. A common feature of these reforms is that the job protection period is as long as or exceeds the maternity benefit period. In contrast, reform 3—which extended the maternity benefit period beyond the job protection period and caused the strongest overall reduction in maternal employment—somewhat worsened mothers' position in the labor market. The reform discouraged up to 4% of mothers from returning to work by their child's sixth birthday and lowered their labor market income 6 years after childbirth by roughly 8%. Although the state government spent approximately DM 6,000 (in 1995 prices) per mother, on average, on additional maternity benefit payments, mothers' cumulative total income, including that from maternity benefit payments, declined by almost DM 4,000 6 years after childbirth. These findings point to the importance of the job guarantee in avoiding long-lasting negative effects of expansions in leave coverage on mothers' postbirth careers. To conclude, the reforms did not succeed in promoting employment continuity or in improving the position of women in the labor market after childbirth.

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stronger assumptions than ours, and their data prevent them from studying the long-run effects of the expansions. Baker and Milligan (2008b, 2010) and Hanratty and Trzcinski (2009) investigate a single reform in Canada that raised the leave period from 20 to 52 weeks. Unlike us, they are not able to identify the causal impact of the reform by comparing mothers who give birth shortly before or shortly after the expansion.

The article is structured as follows. We begin with a description of the major changes in maternity leave legislation in Germany (Sec. II.A). We then briefly discuss the mechanisms through which expansions in maternity leave coverage may affect mothers' labor market outcomes (Sec. II.B). We outline the empirical strategy in Section III and describe the data in Section IV. We report results in Section V and conclude with a discussion of our findings in Section VI.

## II. Background

### A. Maternity Leave Legislation in Germany

In the United States, the FMLA introduced in 1993 requires firms with at least 50 employees to provide 12 weeks of unpaid leave after childbirth. In Germany, mothers have been entitled to paid leave 6 weeks before and 8 weeks after childbirth since the mid-1950s.[7] During the leave period, the firm is not allowed to dismiss the mother, and the mother has the right to return to a job that is comparable to the job she held before childbirth. Payment during this period is equivalent to her average income over the 3 months prior to childbirth (around DM 2,238, in 1985 prices, in 1985, the middle of our sample period), corresponding to a 100% replacement rate. The public health insurance, the federal government, and the employer contribute to the mother's payment during this period. The health insurance pays DM 750 per month, while the federal government provides DM 400 as a one-time payment. The remaining costs (about DM 1,288 per month, on average, in 1985) are borne by the employer.

Starting in the late 1970s, Germany experienced a series of largely unexpected expansions in leave coverage. Figure 1 provides a visual overview of the main reforms. The first reform took place in May 1979 and raised the job protection maternity leave period from 8 weeks to 6 months after childbirth. Payment between 6 weeks before and 8 weeks after childbirth remained unchanged from the mother's average income over the 3 months prior to childbirth. From the third month after childbirth onward, payment was DM 750 per month, or about 44% of average prebirth earnings in 1979 (own calculations based on Social Security records). Only women who were employed before childbirth were entitled to maternity benefits. Maternity benefits from the third month onward are paid solely by the federal government.

In January 1986, the job protection and maximum maternity benefit period was increased from 6 months to 10 months, and a further increase to 12 months starting in January 1988 was announced. An important

[7] The following description of the expansions in maternity leave coverage in Germany is based on Zmarzlik, Zipperer, and Viethen (1999).

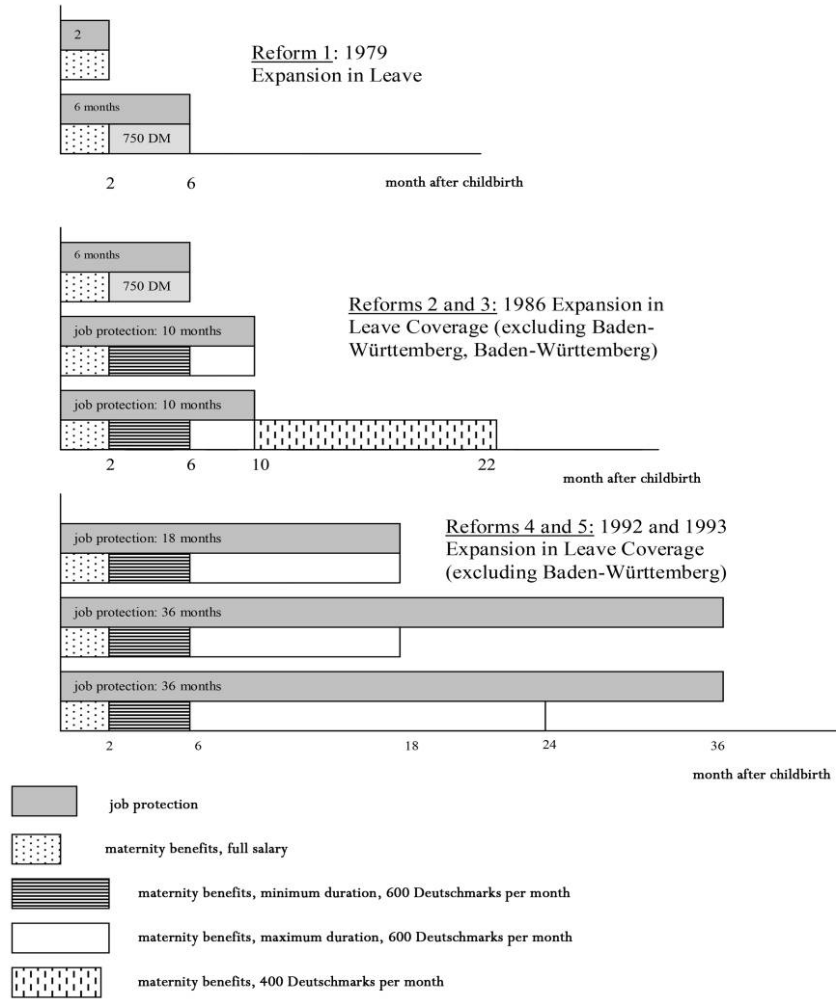


FIG. 1.—Overview of policy reforms. Since 1986, all women—employed before childbirth or not—are entitled to a maternity benefit of DM 600 per month for a minimum of 6 months. From month 7 onward, maternity benefits are means tested and depend on the annual net family income 2 years before childbirth. The majority of women receive benefits longer than 6 months. In January 1988, the job protection and maternity benefit periods were extended from 10 to 12 months. Two further changes occurred in July 1989 and July 1990, when the job protection and maternity benefit periods were increased to 15 and 18 months, respectively.

component of this reform was that all mothers, regardless of employment status before childbirth, became entitled to maternity benefits. A further component was that fathers became eligible for parental leave. However, only a few fathers sign up for parental leave (less than 1.5% in 1992; see Vaskovics and Rost [1999] for a detailed study). Maternity payment from 6 weeks before to 8 weeks after childbirth remained once again unchanged from the mother's income prior to childbirth (or DM 600 per month if the mother was not working before childbirth). From the third to the sixth month after childbirth, maternity benefits declined from DM 750 to DM 600 per month. This corresponds to about 26% of average prebirth earnings in 1986. From months 7 to 10, maternity benefits were means tested and depended on the annual net family income during the 2 years before childbirth. The majority of women received the full maternity benefit of DM 600 for 10 months; in 1986, for example, this proportion was 83.6% (Bundesministerium für Familie, Senioren, Frauen und Jugend 2000).

At the same time, one large state in southern Germany, Baden-Württemberg, introduced an additional maternity benefit of DM 400 per month. The benefit is paid by the state government for 12 months. Payment starts at the end of the federal benefit period. Hence, in Baden-Württemberg, the job protection period was increased from 6 to 10 months while the maternity benefit period was effectively extended from 6 to 22 months.

In July 1989 and July 1990, the job protection and maximum maternity benefit periods were further lengthened to 15 and 18 months, respectively. The final policy reform took place in January 1992, when job-protected leave was increased from 18 to 36 months. Maternity payments still ended at 18 months but were to be extended to 24 months a year later, in January 1993.

Our empirical analysis focuses on five reforms in maternity leave coverage that differ with respect to the expansion of the job protection relative to that of the maternity leave period (see also fig. 1). The 1979 and 1986 (excluding Baden-Württemberg) reforms—which we refer to as reform 1 and reform 2 throughout the article—are examples of expansions in leave coverage that increased the job protection and maternity benefit periods by the same amount. The 1986 reform in Baden-Württemberg (reform 3), in contrast, raised the maternity benefit period by more than the job protection period. This allows us to analyze the impact of maternity benefit payments that are not job protected. The 1992 reform (reform 4) increased the job protection period by 18 months but left the maternity benefit period unchanged, whereas the 1993 reform (reform 5) increased the maternity benefit period by 6 months but left the job protection period unchanged. These reforms allow us to disentangle the impact of job protection from that of maternity benefits on mothers' labor market outcomes

after childbirth. When evaluating reforms 4 and 5, we exclude from our sample mothers who give birth in Baden-Württemberg.[8]

### B. Mechanisms and Motivation of Outcome Variables

How do expansions in maternity leave coverage affect mothers' labor market outcomes after childbirth? Most importantly, an extension of the job protection as well as of the maternity benefit period provides incentives for mothers to stay away from work during that period (see, e.g., Klerman and Leibowitz 1997). Note that mothers value job protection (without the provision of benefits) only in a labor market with search frictions in which it takes time to find a job or it is difficult to find a job that provides the same utility as the prebirth job. This could be either because of firm-, occupation-, or task-specific human capital or because of match-specific search capital. Since the value of staying at home drops discontinuously when maternity benefits are exhausted or when job protection ends, we expect a spike in mothers' return behavior at the end of the job protection period as well as at the end of the maternity benefit period (provided that the job protection period exceeds the maternity benefit period so that women have a job to return to at maternity benefit exhaustion).[9]

Why may expansions in maternity leave coverage affect women's labor force participation rates in the long run, after the job protection and maternity benefit periods have ended? There are two opposing effects. On the one hand, an expansion in leave coverage may encourage employment continuity of mothers. To see why, take as an example reform 1, which increased job-protected maternity leave from 2 to 6 months. Suppose that a mother is not ready to go back to her prebirth employer 2 months after childbirth, even knowing that by not returning to her prebirth employer now, she will lose the employment guarantee. Suppose that she is willing to return to her prebirth employer 6 months after childbirth. The reason could be that her utility of staying with her child declines with the child's age. This woman would be observed working 6 months after childbirth under the new legislation but not necessarily under the old legislation since she may not have found a job at all or since she may not have found a job that is as well paid as

[8] In Baden-Württemberg, reform 4 increased the job protection period from 18 to 36 months and left the maternity benefit period unchanged at 30 (18 + 12) months after childbirth. Reform 5 left the job protection period unchanged at 36 months and extended the maternity benefit period from 30 to 36 (24 + 12) months after childbirth.

[9] There might also be a spike in mothers' return behavior at maternity benefit exhaustion if the maternity benefit period exceeds the job protection period and women therefore have no job lined up. This would correspond to a spike in the job-finding hazard rate around the time unemployment benefits end. However, Card, Raj, and Weber (2007) show that while spikes in the unemployment exit hazard rate at unemployment benefit exhaustion are common, spikes in the job-finding hazard rate at benefit exhaustion are small.

her prebirth job because of the loss in specific capital. On the other hand, an expansion in leave coverage causes women to spend more time away from work, and this delay may induce them to take even more time off from work. Such a causal impact of time away from work on long-run participation rates could arise because of human capital depreciation: if women's employment opportunities decline with the time away from work, women may become less and less likely to return to work the more time they spend away from work.[10] Alternatively, a mother may learn how enjoyable it is to be with her child while on maternity leave, and spending more time with her child may cause her to want to spend even more time with her child.

When analyzing the impact of the expansions in leave on mothers' labor supply after childbirth, we focus on three outcome variables. Our first outcome variable is the probability that the mother has returned to work by month $t$ after childbirth. Since mothers may drop out of the labor market after their return (for instance, because they have a second child), we consider the probability that the mother is working in month $t$ after childbirth as a second outcome variable. Here, we distinguish between full-time and part-time work. Our third outcome variable, the number of months the mother has worked through month $t$ after childbirth, captures the overall impact of the expansions in leave coverage on maternal employment.

Why may maternity leave policies affect women's postbirth labor market income? The same two opposing effects described above are at work here. On the one hand, since expansions in maternity leave coverage induce women to postpone their return to work, women have less time to accumulate labor market skills and may lose more skills while at home. On the other hand, more generous leave policies may allow mothers to retain firm- or occupation-specific human or search capital. This is the main reason put forward in the literature for why maternity leave legislation may alleviate adverse effects of career interruptions (e.g., Klerman and Leibowitz 1997; Waldfogel 1998; Hashimoto et al. 2004). Moreover, during the job protection period, women are willing to accept an outside offer only if it dominates that of their prebirth employer (as opposed to nonemployment). This leads to a higher reservation wage. An increase in maternity benefits has the same effect. Hence, an extension of the job protection or maternity benefit period may raise wages also for women who return to an outside employer after childbirth.

Moreover, expansions in leave coverage may affect the labor market income of working mothers if they change the selection of mothers into work. This is especially problematic if the expansions increased or lowered mothers' long-run attachment to the labor market after childbirth. In or-

[10] Of course, if mothers are aware that more time away from work makes them less valuable in the labor market because of human capital depreciation, this will be reflected in their reservation wage and hence their return behavior.

der to avoid this concern, we include mothers who are not working in our sample and set their monthly labor market income to zero. Hence, this variable captures, in addition to the channels described above, the impact of the reforms on mothers' postbirth labor force participation rates. In order to analyze whether the extended payment of maternity benefits financially compensated mothers for a potential loss in labor market income, we also investigate the impact of the reforms on mothers' cumulative total income, including that from maternity benefit payments, obtained through month $t$ after childbirth.

## III. Identification Strategy

We estimate the causal effect of an expansion in leave coverage on mothers' labor market outcomes using a difference-in-difference design. We first compare outcomes of mothers who give birth shortly before or shortly after a change in maternity leave legislation (3 months in our baseline specification). This simple difference leads to a biased estimate of the causal impact of the reform if there are systematic differences between mothers who give birth in different months; see, for example, Buckles and Hungerman (2013) for a recent analysis. In order to isolate the causal impact of the policy reform from such seasonal effects, we use as a control group mothers who give birth in the same months but in a year in which no reform took place. A similar strategy has, for instance, been used by Lalive and Zweimüller (2009) and Lalive et al. (2011) to evaluate the impact of an Austrian policy reform on mothers' fertility and labor market outcomes and by Ekberg, Eriksson, and Friebel (2005) to analyze the impact of Sweden's "daddy month reform" on the labor supply of fathers.

We estimate regressions of the following type on mothers who sign up for maternity leave:[11]

$$\begin{aligned} Y_{it}^{\text{Mother}} = {} & \alpha_{0t}^{\text{ML}} + \alpha_{1t}^{\text{ML}}\text{Cohort}_i + \alpha_{2t}^{\text{ML}}\text{Month}_i \\ & + \alpha_{3t}^{\text{ML}}\text{Cohort}_i \times \text{Month}_i + x_i'\alpha_{4t}^{\text{ML}} + u_{it}^{\text{ML}}, \end{aligned} \tag{1}$$

where $x_i'$ is a vector of mothers' characteristics determined prior to childbirth, $\text{Cohort}_i$ is an indicator variable equal to one if mother $i$ belongs to the cohort that was affected by the reform in maternity leave legislation (referring, e.g., to mothers who give birth between October 1991 and March 1992 in our baseline specification for reform 4), $\text{Month}_i$ is an indicator variable equal to one if the mother gives birth in the months just after the reform came into effect (referring, e.g., to mothers who give birth between January and March), and $\text{Cohort}_i \times \text{Month}_i$ is the interaction be-

[11] Our data do not allow us to identify women who give birth and do not sign up for maternity leave; see Sec. IV.

tween these two variables (referring, e.g., to mothers who give birth between January and March 1992). The coefficient on this interaction ($\alpha_{3t}^{ML}$) is the coefficient of interest and identifies the effect of an expansion in maternity leave coverage on mothers' labor market outcomes in month $t$ after childbirth.

We estimate this regression separately for each policy reform (which we index by the superscript ML) and separately by time since childbirth (which we index by the subscript $t$). Our baseline regressions include all mothers who give birth 3 months before or 3 months after a policy reform. Because of measurement error in the child's month of birth (see Sec. IV and app. B), we exclude mothers who give birth within 2 months of the policy reform. Our control group consists of all mothers who give birth in the same months but 1 year before or 1 year after the expansion in leave coverage took place.[12] For robustness, we also report, for some outcome variables, results that include mothers who give birth and take maternity leave 1 month or 6 months before or after an expansion in leave coverage and results that use alternative control groups.[13]

There are two potential threats to this identification strategy. First, the strategy would not be valid if women are able to time the birth of their child as a response to the change in maternity leave legislation. The second threat to our identification strategy is that mothers' decision to sign up for maternity leave may be influenced by the reform. The first threat seems unlikely for reforms 1–4 since mothers could not precisely anticipate these reforms: the draft bills for these reforms were proposed after the children born within 3 months of the policy reform were conceived (see Dustmann and Schönberg [2012] for details). One might argue that some discussion on these bills may have been in the public domain before the draft bills were proposed. We searched two leading German newspapers (*Süddeutsche Zeitung* and *Frankfurter Allgemeine*) for articles about the reform. The first articles typically appeared no more than 2 months before the reform was finally implemented. Women may nevertheless have some possibilities to time the birth of their child through induced births or cesarean sections. This, however, allows women to bring the birth date forward,[14] whereas in our case women would like to postpone childbirth in

[12] For reforms 4 and 5, our control group consists of mothers who give birth 1 year (2 years) before or 2 years (1 year) after the expansion in leave coverage; i.e., in our baseline regression, our control group consists of all mothers who give birth between October 1990 and March 1991, and between October 1993 and March 1994.

[13] In these regressions, we correct for the downward bias in our estimates caused by the measurement error in the child's birth month; see app. B for details.

[14] Dickert-Conlin and Chandra (1999) find that in order to qualify for tax benefits, women in the United States are more likely to give birth in the last week of December than in the first week of January, partly because of a more extensive use of cesarean sections.

order to benefit from the more generous leave policy.[15] The endogenous timing of births is more problematic for reform 5, which was announced 1 year before it came into effect. The findings for reform 5 should therefore be interpreted with some caution.

Similarly, the second threat that mothers' decision to sign up for maternity leave is affected by the expansion in leave coverage is unlikely to be a concern for the first four unexpected policy reforms but could be problematic for the preannounced fifth expansion in leave coverage. The reason is that women who are employed at a later stage of their pregnancy—that is, when they learned about the expansion in leave coverage—have a strong incentive to sign up for maternity leave irrespective of the length of the job protection or maternity benefit period in order to receive their full salary 6 weeks prior and 8 weeks after childbirth.

In order to further validate our identification strategy, in appendix table A1 we compare mothers who give birth and go on maternity leave 3 months before an expansion in leave coverage with those who give birth and sign up for maternity leave 3 months after an expansion in leave coverage in terms of their observable prebirth characteristics. Specifically, we estimate regressions of type (1), but with the mother's age at birth, as well as her log earnings, years of education, and full-time status around conception (i.e., 9 months prior to childbirth) as dependent variables. While differences are small for all policy reforms, three out of four differences are statistically different from zero for the preannounced reform 5. This emphasizes once more that our findings for reform 5 have to be interpreted with some caution. We control for women's prebirth characteristics in our baseline regression, but including them in our regressions has hardly any impact on our estimates.

## IV. Data

Our data come from Social Security records, provided by the Institute for Labor Market Research (IAB) in Nuremberg. The data allow us to construct the complete work history—including time spent in unemployment and on leave of absence—of every man and woman covered by the Social Security system. Not included in the data are civil servants (including teachers) and the self-employed.[16] From this database, we select all West

[15] Gans and Leigh (2009) provide empirical evidence that women also have some possibilities of delaying childbirth. They find that the introduction of a $3,000 "baby bonus" in Australia led to a drop in the number of births just before, and to an increase just after, the policy commenced, although the policy was announced only 7 weeks before its introduction. Our baseline regressions exclude mothers who give birth within 1 month of the policy reform because of measurement error in the child's month of birth. This exclusion also deals with this concern.

[16] In 2001, 77.2% of all workers in the German economy were covered by Social Security and are hence recorded in the data (Bundesagentur für Arbeit 2004).

German women who sign up for maternity leave between 1976 and 1994 and are between 16 and 45 years of age.

An important advantage of our data set is its large sample size; in our final sample, there are at least 13,000 women who go on maternity leave each month. This is crucial for our estimation strategy, which consists of comparing women who give birth just before and just after a change in maternity leave legislation. A further advantage is that, because of the administrative nature of the data, employment and earnings are measured precisely.

The main disadvantage of our data is that they do not contain direct information on children. We observe only whether and when a woman goes on leave of absence. This causes two problems. First, not all leave taking may be maternity in nature. Alternative reasons for leave of absence include military service, illness, disability, and early retirement. Our sample may thus include some women who are on leave but have not given birth. Second, we have to infer the child's month of birth from the month the mother signs up for leave of absence. Since women are entitled to go on maternity leave 6 weeks before their due date, we approximate the birthday of the child as 6 weeks after the mother went on leave. This is likely to lead to some measurement error in the child's month of birth.

Schönberg (2009) uses an additional data source, the IABS 75–95 Plus, to address both problems. The IABS 75–95 Plus is a 1% random sample drawn from our database, supplemented with precise information on when a woman gives birth. Although this data set is principally available from 1975 to 1995, reliable information on fertility exists only from 1986 on. Schönberg first shows that after some appropriate restrictions are imposed, at least 90% of leave spells in the data are maternity in nature.[17] In appendix B, we argue that this type of measurement error is likely to lead to a downward bias in our estimates of about 10%.

Schönberg (2009) further shows that the child's month of birth, inferred from the start of the mother's leave spell, is correctly measured in at least 70% of the cases. In about 12% of the cases, the true month of birth is either over- or underestimated by 1 month. In about 5% of the cases, the true month of birth differs from the observed one by more than 1 month. This type of measurement error implies that some women whom we record as giving birth 1 month before a change in maternity leave legislation (e.g., in December 1991) have in fact given birth after the change (e.g., in January 1992), and vice versa. In our baseline regressions, we deal with this type of measurement error by excluding mothers who give birth in the month just before and after the change in maternity leave legislation (e.g.,

[17] These restrictions are as follows: the leave spell must not start on January 1, the leave spell must last at least 2 months, the leave spell must not be preceded by a spell in apprenticeship training, and the leave spell must not be preceded by a spell in unemployment.

in December 1991 and January 1992). This ensures that we assign the true legislation to about 97.5% of mothers; see appendix B for details.

We consider a mother as having returned to the labor market if she works for at least 2 consecutive months after childbirth. Full- and part-time work are defined as working more than 30 hours and from 20 to 30 hours per week, respectively.[18] Labor market income in month $t$ after childbirth is equal to earnings in month $t$ if the mother is working in that month and zero otherwise. To compute the mother's cumulative total income through month $t$ after childbirth, we add up the mother's monthly total income in each month since childbirth. We define the mother's monthly total income in month $t$ after childbirth as her monthly earnings if she is working, as the maternity benefit if she is not working but is entitled to maternity benefits, and zero otherwise. We deflate earnings and maternity benefits by the consumer price index, using 1995 as our base year. Hence, income is measured in 1995 prices; that is, the maternity benefit of DM 750 in 1979 is worth DM 1,190 in 1995 prices, compared to the DM 600 mothers are entitled to in 1995.

When evaluating the short-run effect of the policy reforms on mothers' labor market outcomes after childbirth, we focus on outcomes 1 month after the old leave period ended (e.g., 3 months after childbirth for reform 1, which extended the job protection and maternity benefit period from 2 to 6 months).[19] In the tables, we note the short-run effects of the reforms with an asterisk. When analyzing the long-run effects of the reforms, we measure outcomes 16, 28, 40, . . . , 76 months after childbirth. This ensures that for all women included in our baseline sample, outcomes refer to the same calendar year.

## V. Results

We first investigate the impact of the expansions in leave coverage on women's labor supply after childbirth (Sec. V.A). We then turn to their impact on income (Sec. V.B).

Throughout the article, our results refer to mothers who sign up for maternity leave as opposed to all mothers. In figure 2, we plot the share of mothers who take some maternity leave. The vertical lines refer to the main expansions in leave coverage, which we analyze in this article. We first approximate this share as the ratio between the number of all births to

[18] Part-time jobs with less than 20 hours per week are not included in our data as they are not covered by the Social Security system.

[19] We measure outcomes 1 month after the end of the old leave period as opposed to right when the leave period ends because of measurement error in the child's month of birth. Since we over- or underestimate the child's month of birth by 1 month for roughly 30% of mothers (see app. B), we observe some women returning to work in month $t + 1$ after childbirth, although they in fact returned to work 1 month earlier.

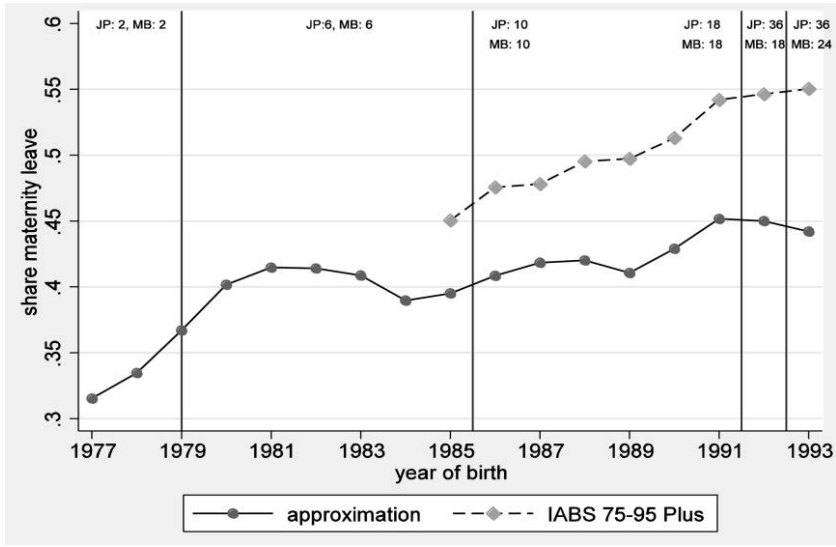


FIG. 2.—Maternity leave take-up over time. The solid line (or dots) approximates the share of mothers who sign up for maternity leave as the number of women on leave in our data divided by the number of births in that year. This measure is best interpreted as a lower bound for the true share as our data cover only 80% of the German workforce. The dashed line (or diamonds) provides a more reliable estimate of the share of mothers who sign up for maternity leave based on the IABS 75–95 Plus. Vertical lines indicate the main expansions in leave coverage, which we analyze in this article. "JP" denotes the length of the job protection period, and "MB" denotes the length of the maternity benefit period. Data source: Solid line: IAB Social Security data combined with Vital Statistics. Dashed Line: IABS 75–95 Plus.

German citizens and the number of women on maternity leave in our data (solid line). There is a clear upward trend in leave taking: the share increased from 31.5% in 1977 to 44.2% in 1993. These numbers probably underestimate the incidence of leave taking as our data exclude up to 20% of the German workforce. We provide a more reliable estimate based on an additional data source, the IABS 75–95 Plus (dashed line). As expected, this data source reveals an almost 8 percentage point higher incidence of leave taking.

## A. Maternity Leave Legislation and Mothers' Labor Supply after Childbirth

### *1. Return to Work*

In figure 3, we plot the share of women who have not returned to work by month *t* after childbirth, separately for women who give birth 3 months

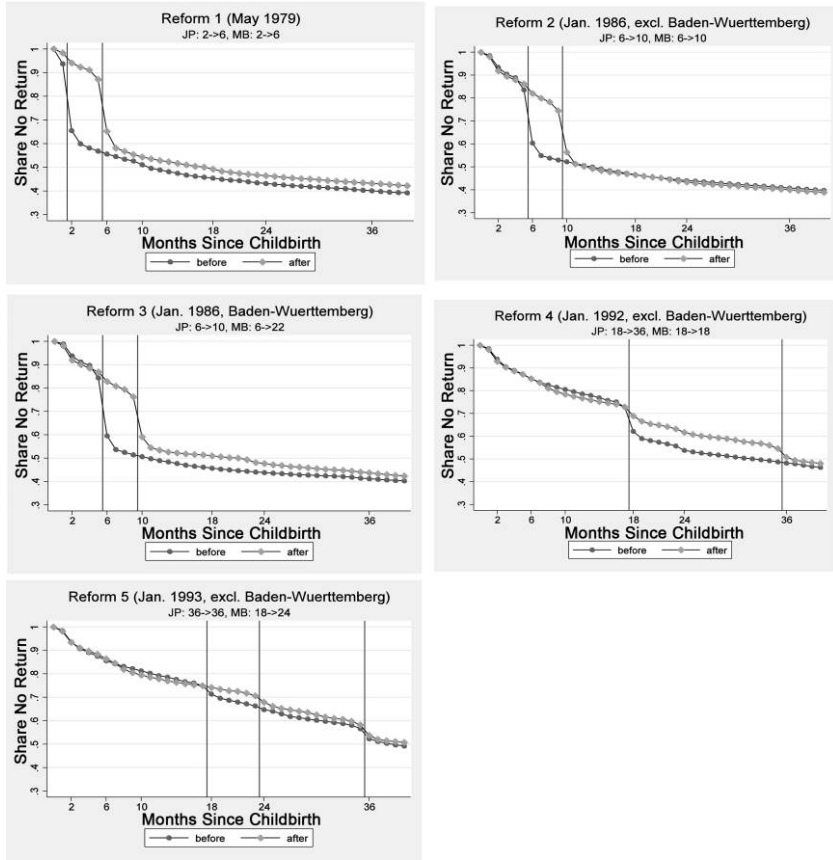


FIG. 3.—Expansions in maternity leave coverage and mother's return to the labor market. The figures plot the share of mothers who have not returned to work by month $t$ after childbirth of mothers who give birth 3 months before or 3 months after an expansion in maternity leave coverage. Because of measurement error in the child's month of birth, mothers who give birth 1 month before or 1 month after an expansion in leave coverage are excluded from the sample. The vertical lines refer to the length of the job protection or maternity benefit period before and after the expansion in leave coverage. "JP" denotes the length of the job protection period, and "MB" denotes the length of the maternity benefit period. Data source: IAB Social Security records, mothers who signed up for maternity leave.

before and 3 months after a policy reform. We exclude mothers who give birth 1 month before or 1 month after a policy reform. In each panel, the solid vertical lines refer to the length of the job protection or maternity benefit period before and after the expansion in leave coverage (e.g., 2 and 6 months for reform 1). The figures show that a considerable fraction of

mothers return to the labor market exactly at the end of the job protection or maternity benefit period, that is, 2, 6, 10, 18, 24, or 36 months after childbirth. This effect is stronger for the shorter leave periods of 2, 6, or 10 months (reforms 1–3) than for the longer leave periods of 18, 24, and 36 months (reforms 4 and 5).

We provide more details in table 1, where we report, for our baseline specification, difference-in-difference estimates based on regression (1). In each panel, our dependent variable in the first row is an indicator variable that is equal to one if the mother went back to work by the $t$th month after childbirth. Reform 1—which increased both the job protection and maternity benefit periods from 2 to 6 months after childbirth—lowered the share of mothers who had returned to work by the third month after childbirth by 30.5 percentage points. Reforms 2 and 3—which increased the job protection period from 6 to 10 months and the maternity benefit period from 6 to 10 and from 6 to 22 months after childbirth, respectively—led to a decline of similar magnitude in the probability that the mother had reentered the labor market by month 7 after childbirth (27.5% and 30.3%). Reform 4—which extended the job protection period from 18 to 36 months and left the maternity benefit period unchanged at 18 months after childbirth—caused a reduction in the share of mothers who had returned to work by month 19 after childbirth of 9.6 percentage points, while reform 5—which raised the maternity benefit period from 18 to 24 months and left the job protection period unchanged at 36 months after childbirth—led to a somewhat lower reduction in the share of mothers who had gone back to work by month 24 after childbirth (5.8%). The findings based on reform 4 highlight that mothers' decision when to return to the labor market after childbirth is affected not only by the payment of maternity benefits but also by the job protection period.

What about the long-run effects of the expansions in leave on mothers' return decision, after the job protection and maternity benefit periods of the new policy ended? Reforms 1, 2, 4, and 5 slightly reduced the probability that the mother had gone back to work by months 52 and 76 after childbirth by about 1–2 percentage points. Reform 3, which extended the maternity benefit period beyond the job protection period, had a stronger negative impact on the mother's return decision and lowered the probability that she had reentered the labor market by months 52 and 76 after childbirth by 4.5 and 3.8 percentage points, respectively.

We report robustness checks in appendix table A2. All specifications give similar results. The only difference between estimates in the first rows and our baseline estimates in table 1 is that we do not include mothers' prebirth characteristics as control variables. In the second rows, our control group consists of mothers who give birth 1 year before (1 year after reform 5) the expansion in leave coverage came into effect, as opposed to 1 year before and 1 year after as in our baseline regressions. In the third

**Table 1**
**Expansions in Maternity Leave Coverage and Mothers' Labor Force Attachment after Childbirth**

| | Reform 1: Job Protection: 2 → 6, Maternity Benefit: 2 → 6 (May 1979) ($N$ = 182,679) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 3* | 7 | 16 | 28 | 52 | 76 |
| 1. Share not returned to labor market by | −.305 | −.020 | −.019 | −.012 | −.010 | −.009 |
| | (.004) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 2. Share working in | −.284 | .029 | .007 | .008 | .011 | .007 |
| | (.004) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 3. Number of months worked through | −.597 | −1.091 | −.959 | −.873 | −.672 | −.495 |
| | (.009) | (.024) | (.061) | (.109) | (.200) | (.289) |
| | Reform 2: Job Protection: 6 → 10, Maternity Benefit: 6 → 10 (January 1986, Excluding Baden-Württemberg) ($N$ = 171,243) | | | | | |
| | Months since Childbirth | | | | | |
| | 7* | 11 | 16 | 28 | 52 | 76 |
| 1. Share not returned to labor market by | −.275 | −.038 | −.026 | −.019 | −.012 | −.009 |
| | (.005) | (.005) | (.005) | (.005) | (.005) | −(.005) |
| 2. Share working in | −.269 | −.002 | .001 | .001 | .008 | .000 |
| | (.005) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 3. Number of months worked through | −.512 | −1.038 | −1.033 | −1.050 | −.965 | −.951 |
| | (.018) | (.033) | (.054) | (.104) | (.197) | (.285) |
| | Reform 3: Job Protection: 6 → 10, Maternity Benefit: 6 → 22 (January 1986, Baden-Württemberg) ($N$ = 36,025) | | | | | |
| | Months since Childbirth | | | | | |
| | 7* | 11* | 16* | 28 | 52 | 76 |
| 1. Share not returned to labor market by | −.303 | −.092 | −.086 | −.067 | −.045 | −.038 |
| | (.010) | (.011) | (.011) | (.011) | (.011) | (.010) |
| 2. Share working in | −.293 | −.064 | −.065 | −.030 | −.001 | −.023 |
| | (.010) | (.011) | (.011) | (.011) | (.011) | (.011) |
| 3. Number of months worked through | −.541 | −1.238 | −1.548 | −2.169 | −2.373 | −2.839 |
| | (.039) | (.072) | (.117) | (.228) | (.429) | (.619) |

**Table 1** (*Continued*)

| | Reform 4: Job Protection: 18 → 36, Maternity Benefit: 18 → 18 (January 1992, excluding Baden-Württemberg) ($N$ = 218,089) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28* | 40 | 52 | 76 |
| 1. Share not returned to labor market by | −.007 | −.096 | −.085 | −.023 | −.022 | −.008 |
| | (.003) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 2. Share working in | −.007 | −.102 | −.061 | .017 | .004 | .013 |
| | (.003) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 3. Number of months worked through | −.031 | −.366 | −1.074 | −1.345 | −1.267 | −1.101 |
| | (.016) | (.050) | (.077) | (.114) | (.151) | (.225) |
| | Reform 5: Job Protection: 36 → 36, Maternity Benefit: 18 → 24 (January 1993, excluding Baden-Württemberg) ($N$ = 214,868) | | | | | |
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28 | 40 | 52 | 76 |
| 1. Share not returned to labor market by | −.011 | −.058 | −.038 | −.021 | −.019 | −.012 |
| | (.003) | (.004) | (.004) | (.005) | (.004) | (.004) |
| 2. Share working in | −.010 | −.069 | −.027 | −.006 | −.008 | .002 |
| | (.003) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 3. Number of months worked through | −.072 | −.373 | −.819 | −.972 | −1.043 | −1.094 |
| | (.016) | (.051) | (.078) | (.114) | (.150) | (.224) |

SOURCE.—IAB Social Security records, mothers who signed up for maternity leave.

NOTE.—The table reports difference-in-difference estimates based on regression (1) for the impact of five expansions in leave coverage on the probability that the mother has returned to work by month $t$ after childbirth (rows 1), on the probability that the mother is working in month $t$ after childbirth (rows 2), and on the number of months worked through month $t$ since childbirth (rows 3). Results refer to our baseline specification and include mothers who give birth 3 months before or 3 months after an expansion in leave coverage. Owing to measurement error in the child's month of birth, we exclude mothers who give birth 1 month before or 1 month after the expansion in leave coverage. The control group consists of mothers who give birth in the same months but 1 year before (2 years before for reform 5) or 1 year after (2 years after for reform 4) an expansion in leave coverage. Regressions control for mothers' prebirth characteristics. Robust standard errors are in parentheses.

* These cells represent the short-term effects of the expansions, referring to after the old and before the new leave policy ends.

rows, we restrict the sample to mothers who give birth 1 month before or 1 month after a policy reform. In order to correct for the attenuation bias due to the measurement error in the child's birthday, we divide our estimates by 0.7, that is, the share of mothers for whom we correctly measure their child's month of birth (see app. B for a justification). In the fourth rows, we widen the estimation sample to mothers who give birth 6 months

before or 6 months after an expansion in leave coverage and exclude, as in our baseline specification, mothers who give birth 1 month before or 1 month after an expansion in leave coverage.

### 2. *Labor Force Participation Rates*

Mothers may only temporarily return to the labor market after childbirth and drop out of the labor market at a later stage, for instance, because they have another child. A temporary return to work is common in our sample. To give only one example, while 65% of mothers have returned to work sometime after childbirth by the time their child is 6 years old, only 39% of mothers are actually employed at their child's sixth birthday. In order to provide a more complete picture of the impact of the expansions in leave coverage on mothers' labor supply after childbirth, we repeat the analysis above, now using an indicator variable that is equal to one if the mother is working in the $t$th month after childbirth as our dependent variable (rows 2 in table 1). While both variables produce similar results with respect to the short-run effects, they slightly differ with respect to the long-run effects. Although each expansion deterred a small fraction of mothers from returning to the labor market by their child's sixth birthday, reforms 1, 2, 4, and 5 did not significantly lower, and may even have slightly increased, the probability that the mother is working 28 or 76 months after childbirth. This suggests that the mothers who were deterred from reentering the labor market by an expansion in leave coverage would have returned to the labor market only temporarily if the reform had not taken place.[20] The 95% confidence intervals for the probability that the mother is working 76 months after childbirth are [−0.003, 0.017] for reform 1, [−0.010, 0.010] for reform 2, [0.005, 0.021] for reform 4, and [−0.006, 0.010] for reform 5. We find a small long-lasting negative impact on mothers' labor force participation rates only for reform 3, which extended the maternity benefit period beyond the job protection period; this reform reduced the probability that the mother is employed 28 and 76 months after childbirth by 3.0 and 2.3 percentage points, respectively.

In the third rows of table 1, we report the impact of the expansions in leave coverage on the number of months the mother has worked through month $t$ after childbirth. Reform 1 lowered the number of months the mother has worked through month 7 after childbirth by 1.091 months, compared to only 0.495 month through month 76 after childbirth. Reforms 2, 4, and 5 led to a somewhat larger decline in maternal employment 76 months after childbirth of 0.951 month, 1.101 months, and 1.094 months, respectively. Reform 3 caused the strongest reduction in maternal employ-

[20] Lalive et al. (2011) make a similar point.

ment: the number of months the mother has been employed through the first 16 and 76 months after childbirth decreased by 1.548 and 2.839 months, respectively.

### 3. *Full-Time Work and Employer Continuity*

Did the expansions in leave coverage affect full-time work after childbirth? In rows 1 of table 2, we display, for our baseline specification, difference-in-difference estimates based on regression (1), now using an indicator variable that the mother is working full-time as our dependent variable. The impact of the policy reforms on the probability that the mother is working full-time right after the old job protection or maternity benefit period ended (e.g., 3 months after childbirth for reform 1) is roughly one-third lower than the impact on the probability that the mother is working (full-time or part-time) at that time. For instance, reforms 1 and 2 reduced the probability that the mother is employed in months 3 and 7 after childbirth by 28.4 and 26.9 percentage points (table 1, rows 2) but lowered the probability that the mother is working full-time by only 21.3 and 17.9 percentage points, respectively. This suggests that roughly two-thirds of the short-run reduction in maternal employment caused by the expansions in leave coverage is due to a reduction in full-time work. The long-run effects of the policy reforms on full-time work, after the new leave period ended, are close to zero and typically not statistically significant for reforms 1, 2, 4, and 5. For instance, the 95% confidence intervals for the probability that the mothers are working full-time in month 76 after childbirth are [−0.005, 0.011] for reform 1, [−0.011, 0.005] for reform 2, [−0.006, 0.006] for reform 4, and [−0.013, −0.000] for reform 5. Reform 3 had a somewhat larger negative impact on full-time work in the long run and caused a reduction in the probability that the mother is working 76 months after childbirth by 1.8 percentage points.

Did the expansions in leave coverage increase employer continuity? We investigate this in rows 2 of table 2, where we report, for our baseline specification, difference-in-difference estimates based on regression (1), using as our dependent variable the probability that the mother is employed at her prebirth employer $t$ months after childbirth. The impact of the policy reforms on the probability that the mother is working for her prebirth employer right after the old job protection or maternity benefit period ended is only slightly lower than the impact on the probability that the mother is working at that time. For instance, reforms 3 and 4 decreased the probability that the mother is employed 7 and 19 months after childbirth by 29.3 and 10.2 percentage points (table 1, rows 2) and reduced the probability that the mother is working for her prebirth employer by 26.4 and 8.4 percentage points, respectively. Hence, the majority of mothers who delay their return to the labor market as a result of an expansion in leave coverage would have initially

**Table 2**
**Expansions in Maternity Leave Coverage, Mothers' Full-Time Work and Mothers' Employer Continuity after Childbirth**

| | Reform 1: Job Protection: 2 → 6, Maternity Benefit: 2 → 6 (May 1979) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 3* | 7 | 16 | 28 | 52 | 76 |
| 1. Share working full-time | −.213 | .034 | .004 | .004 | .004 | .003 |
| | (.004) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 2. Share working for prebirth employer | −.259 | .033 | .010 | .006 | .008 | .007 |
| | (.004) | (.005) | (.005) | (.004) | (.004) | (.004) |
| | Reform 2: Job Protection: 6 → 10, Maternity Benefit: 6 → 10 (January 1986, excluding Baden-Württemberg) | | | | | |
| | Months since Childbirth | | | | | |
| | 7* | 11 | 16 | 28 | 52 | 76 |
| 1. Share working full-time | −.179 | .007 | .001 | −.001 | .002 | −.003 |
| | (.004) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 2. Share working for prebirth employer | −.247 | .004 | .005 | .004 | .005 | .005 |
| | (.004) | (.005) | (.005) | (.005) | (.004) | (.004) |
| | Reform 3: Job Protection: 6 → 10, Maternity Benefit: 6 → 22 (January 1986, Baden-Württemberg) | | | | | |
| | Months since Childbirth | | | | | |
| | 7* | 11* | 16* | 28 | 52 | 76 |
| 1. Share working full-time | −.188 | −.033 | −.037 | −.017 | −.005 | −.018 |
| | (.009) | (.010) | (.009) | (.009) | (.009) | (.009) |
| 2. Share working for prebirth employer | −.264 | −.036 | −.033 | −.010 | .000 | −.007 |
| | (.010) | (.011) | (.011) | (.010) | (.009) | (.009) |
| | Reform 4: Job Protection: 18 → 36, Maternity Benefit: 18 → 18 (January 1992, excluding Baden-Württemberg) | | | | | |
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28* | 40 | 52 | 76 |
| 1. Share working full-time | −.001 | −.056 | −.029 | .005 | .000 | .000 |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| 2. Share working for prebirth employer | −.007 | −.084 | −.043 | .019 | .008 | .011 |
| | (.003) | (.038) | (.004) | (.004) | (.004) | (.004) |

**Table 2** (*Continued*)

| | Reform 5: Job Protection: 36 → 36, Maternity Benefit: 18 → 24 (January 1993, excluding Baden-Württemberg) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28 | 40 | 52 | 76 |
| 1. Share working full-time | −.007 | −.037 | −.016 | −.009 | −.005 | −.006 |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| 2. Share working for prebirth employer | −.006 | −.055 | −.021 | −.002 | −.003 | .003 |
| | (.003) | (.004) | (.004) | (.004) | (.004) | (.004) |

SOURCE.—IAB Social Security records.

NOTE.—The table reports difference-in-difference estimates based on regression (1) for the impact of five expansions in leave coverage on the probability that the mother is working full-time in month *t* after childbirth (rows 1) and on the probability that the mother is employed at her prebirth employer in month *t* after childbirth (rows 2). Results refer to our baseline specification and include mothers who give birth 3 months before or 3 months after an expansion in leave coverage. Owing to measurement error in the child's month of birth, we exclude mothers who give birth 1 month before or 1 month after the expansion in leave coverage. The control group consists of mothers who give birth in the same months but 1 year before (2 years before for reform 5) or 1 year after (2 years after for reform 4) an expansion in leave coverage. Regressions control for prebirth characteristics. Robust standard errors are in parentheses.

* These cells represent the short-term effects of the expansions, referring to after the old and before the new leave policy ends.

returned to their prebirth employer if the expansion had not taken place. Neither policy reform—including reform 3, which expanded the maternity benefit period beyond the job protection period and caused the largest reduction in maternal employment—had a strong impact on the probability that the mother is working for her prebirth employer in the long run after the new job protection or maternity benefit period ended. For instance, the 95% confidence intervals for the impact of the reforms on the probability that the mother is employed by her prebirth employer 76 months after childbirth are [−0.001, 0.015] for reform 1, [−0.003, 0.012] for reform 2, [−0.025, 0.011] for reform 3, [0.003, 0.019] for reform 4, and [−0.005, 0.011] for reform 5.

### B. Maternity Leave Legislation and Mothers' Income after Childbirth

How did the expansions in leave coverage affect mothers' income after childbirth? We first analyze the impact of the expansions in leave coverage on mothers' postbirth monthly labor market income, which we define as their monthly earnings if they are employed and zero otherwise. We then turn to the impact of the policy reforms on mothers' cumulative income obtained through month *t* after childbirth. This variable includes maternity benefit payments if the mother is eligible. Finally, we restrict the sample to employed mothers and investigate the impact of the expansions in leave coverage on postbirth earnings for employed mothers.

### 1. Labor Market Income

We display difference-in-difference estimates for the effect of the policy reforms on mothers' postbirth labor market outcome in rows 1 of table 3, focusing on long-run effects after the new job protection or maternity benefit period ended. Results vary somewhat by policy reform. Reforms 1 and 2 had very little impact on mothers' long-run labor market income after childbirth. For instance, the 95% confidence intervals for the impact on monthly labor market income 76 months after childbirth are closely centered around zero ([−23.75, 29.57] for reform 1 and [−37.02, 27.36] for reform 2), with point estimates of DM 2.86 and −DM 4.84, or 0.3% and (negative) 0.4%, respectively. The impact of reform 4 on monthly labor market income 52 and 76 months after childbirth is somewhat more positive (DM 17.01 and DM 25.16, or 1.7% and 2.3%), while that of reform 5 is somewhat more negative (−DM 27.84 and −DM 15.8, or (negative) 2.7% and 1.4%, respectively). However, these effects are mostly not statistically significant at conventional significance levels. Reform 3, which caused the largest reduction in maternal employment, also had the strongest, and (mostly) statistically significant, negative impact on mothers' postbirth monthly labor market income: roughly DM 100, or (negative) 8.5% 76 months after childbirth.

### 2. Cumulative Total Income

With the exception of reform 4, the expansions in leave coverage extended the period during which maternity benefits are paid. Did the extended payment of maternity benefits compensate mothers, on average, for any loss in labor market income? We investigate this in rows 2 of table 3, where we report difference-in-difference estimates for the effect of the expansions in leave coverage on mothers' cumulative total income, including that from maternity benefit payments, obtained through month $t$ after childbirth.

Results again vary by policy reform. Reform 1 increased cumulative total income by roughly DM 2,000 from month 16 to month 76 after childbirth. This is an average effect and masks important distributional effects. The cumulative income of mothers who delay their return to work because of the reform declines as a result of the reform, as the monthly maternity benefit of DM 750 corresponds to only 55% of mothers' average postbirth salary. However, mothers who do not return to work within 6 months of their child's birth under either leave policy receive DM 750 for 4 additional months after the reform. Our results indicate that the latter effect dominates the first effect.

Reform 2, which extended the maternity benefit period by 4 months but lowered the monthly maternity benefit from DM 750 to DM 600, decreased mothers' cumulative total income by about DM 900 after childbirth. Reform 4, which extended only the job protection period and left the ma-

ternity benefit period unchanged, led to a larger reduction in mothers' cumulative total income 52 and 76 months after childbirth of DM 2,751 and DM 2,323, respectively. Reform 5, which extended only the maternity benefit period and left the job protection period unchanged, increased mothers' cumulative total income by DM 1,050 initially 28 months after childbirth. However, because of the negative (albeit small) impact of the reform on mothers' postbirth labor market income, this positive effect vanishes and even becomes negative by the time the child is 76 months old. Similarly, reform 3, which extended the job protection period from 6 to 10 months and the maternity benefit period from 6 to 22 months, had little impact on mothers' cumulative total income initially 16 and 28 months after childbirth. However, the reform caused a reduction in mothers' cumulative total income of almost DM 4,000 by the time the child is 76 months old.

### *3. Labor Market Income of Employed Mothers*

For completeness, we display in rows 3 of table 3 difference-in-difference estimates for the impact of the expansions in leave coverage on the monthly labor market income (in logs) of employed mothers. It is important to bear in mind that these estimates may suffer from a selection bias as the expansions in leave coverage may have changed the type of women who are working after childbirth.[21] While there is some evidence that reform 1 reduced postbirth labor market income of employed mothers 28 and 52 months after childbirth by 1–2 percentage points (an effect that is statistically significant at the 10% level), reforms 2, 4, and 5 had no statistically significant impact on employed mothers' labor market income after childbirth. The 95% confidence intervals for the (log) labor market income 52 months after childbirth are [−0.027, 0.004] for reform 1, [−0.020, −0.008] for reform 2, [−0.010, 0.014] for reform 4, and [−0.014, 0.010] for reform 5. In contrast, reform 3 lowered postbirth labor market income of employed mothers by around 3 percentage points. Hence, the negative effect of this reform on mothers' labor market income after childbirth in row 1 of table 3 is driven not only by the negative effect on mothers' postbirth employment rates but also by lower wages of employed mothers.

## VI. Discussion and Conclusion

This article evaluates the impact of five major expansions in maternity leave coverage in Germany on mothers' labor market outcomes after child-

[21] Note that the positive and statistically significant effect of reform 4 on log earnings of employed mothers 28 months after childbirth (i.e., before the new job protection period ends) is likely due to a selection effect, as mothers who are employed 28 months after childbirth, although they are entitled to 36 months of job-protected leave, are likely to be positively selected compared to mothers who are employed 28 months after childbirth and entitled to only 18 months of job-protected leave.

**Table 3**
**Expansions in Maternity Leave Coverage and Mothers' Income after Childbirth**

| | Reform 1: Job Protection: 2 → 6, Maternity Benefit: 2 → 6 (May 1979) | | | |
|---|---|---|---|---|
| | Months since Childbirth | | | |
| | 16 | 28 | 52 | 76 |
| 1. Monthly labor market income | 9.72 | 8.35 | 5.76 | 2.91 |
| | (13.50) | (13.29) | (13.15) | (13.60) |
| 2. Cumulative total income | 1,935.32 | 2,016.46 | 2,169.78 | 2,161.64 |
| | (171.49) | (309.09) | (571.00) | (833.70) |
| 3. Monthly log earnings, employed mothers | −.005 | −.013 | −.024 | −.011 |
| | (.006) | (.007) | (.007) | (.008) |
| | Reform 2: Job Protection: 6 → 10, Maternity Benefit: 6 → 10 (January 1986, excluding Baden-Württemberg) | | | |
| | Months since Childbirth | | | |
| | 16 | 28 | 52 | 76 |
| 1. Monthly labor market income | −1.20 | −1.74 | 16.86 | −4.87 |
| | (15.06) | (15.12) | (15.67) | (16.42) |
| 2. Cumulative total income | −794.53 | −916.45 | −879.74 | −898.91 |
| | (159.96) | (315.91) | (618.91) | (925.99) |
| 3. Monthly log earnings, employed mothers | −.005 | −.004 | −.006 | −.007 |
| | (.006) | (.006) | (.007) | (.007) |
| | Reform 3: Job Protection: 6 → 10, Maternity Benefit: 6 → 22 (January 1986, Baden-Württemberg) | | | |
| | Months since Childbirth | | | |
| | 16* | 28 | 52 | 76 |
| 1. Monthly labor market income | −163.57 | −111.32 | −54.95 | −97.37 |
| | (31.87) | (32.11) | (33.10) | (34.19) |
| 2. Cumulative total income | −9.81 | −190.06 | −1,886.96 | −3,919.66 |
| | (325.03) | (650.08) | (1,293.65) | (1,944.56) |
| 3. Monthly log earnings, employed mothers | −.007 | −.037 | −.050 | −.028 |
| | (.013) | (.015) | (.017) | (.017) |
| | Reform 4: Job Protection: 18 → 36, Maternity Benefit: 18 → 18 (January 1992, excluding Baden-Württemberg) | | | |
| | Months since Childbirth | | | |
| | 28* | 40 | 52 | 76 |
| 1. Monthly labor market income | −137.19 | 57.20 | 17.01 | 25.16 |
| | (12.22) | (13.61) | (13.78) | (14.10) |
| 2. Cumulative total income | −2,633.70 | −3,019.59 | −2,751.65 | −2,323.98 |
| | (239.75) | (367.08) | (495.79) | (758.05) |
| 3. Monthly log earnings, employed mothers | .022 | .005 | .002 | −.012 |
| | (.006) | (.006) | (.006) | (.006) |

**Table 3** (*Continued*)

| | Reform 5: Job Protection: 36 → 36, Maternity Benefit: 18 → 24 (January 1993, excluding Baden-Württemberg) | | | |
|---|---|---|---|---|
| | Months since Childbirth | | | |
| | 28 | 40 | 52 | 76 |
| 1. Monthly labor market income | −57.89 | −25.16 | −27.84 | −15.88 |
| | (13.37) | (13.92) | (13.97) | (14.50) |
| 2. Cumulative total income | 1,050.41 | 694.73 | 287.27 | −90.09 |
| | (240.61) | (368.32) | (497.52) | (763.64) |
| 3. Monthly log earnings, employed mothers | .011 | −.011 | −.002 | −.002 |
| | (.007) | (.006) | (.006) | (.006) |

SOURCE.—IAB Social Security records, mothers who signed up for maternity leave.

NOTE.—The table reports difference-in-difference estimates based on regression (1) for the impact of five expansions in leave coverage on mothers' labor market income in month *t* after childbirth (rows 1); on mothers' cumulative total income, including maternity benefits, obtained through month *t* after childbirth (rows 2); and on log earnings of employed mothers in month *t* after childbirth (rows 3). Results refer to our baseline specification and include mothers who give birth 3 months before or 3 months after an expansion in leave coverage. Owing to measurement error in the child's month of birth, we exclude mothers who give birth 1 month before or 1 month after the expansion in leave coverage. The control group consists of mothers who give birth in the same months but 1 year before (2 years before for reform 5) or 1 year after (2 years after for reform 4) an expansion in leave coverage. Regressions control for mothers' prebirth characteristics. Robust standard errors are in parentheses.

* These cells represent the short-term effects of the expansions, referring to after the old and before the new leave policy ends.

birth. An important goal of the reforms was to encourage mothers to spend more time with their infants after childbirth, a time that is crucial for the child's development. The reforms achieved this goal: each expansion in leave coverage lowered maternal employment in the short run. Our findings for reforms 4 and 5, which increased only the job protection or maternity benefit period, respectively, further highlight that mothers' decision when to return to work after childbirth is influenced not only by job protection but also by the payment of maternity benefits.

The impact of the expansions in leave coverage on overall maternal employment is, however, small. For instance, reforms 1 and 2 increased both the job protection and maternity benefit periods by 4 months but lowered the number of months the mother worked through the first 6 years after childbirth by less than 1 month. Reform 3, which expanded the job protection period by 4 months and the maternity benefit period by 16 months, had the strongest impact on maternal employment and reduced the number of months the mother worked in the first 6 years after childbirth by almost 3 months.

Despite the considerable short-term effects of the reforms on mothers' employment rates after childbirth, four out of five expansions in leave coverage had only a small impact on mothers' employment rates, employer

continuity, and labor market income in the long run, 3–6 years after childbirth. This suggests that the reductions in maternal employment induced by these reforms were too small to result in a large depreciation of the mother's stock of human capital and hence in lower postbirth employment rates and labor market income. This further suggests that the reforms did not lead to improvements in mothers' specific capital after childbirth that are large enough to lead to substantially higher postbirth employment rates and labor market income.

The common feature of these reforms is that the job protection period is as long as or exceeds the maternity benefit period. Our findings based on reform 3, which increased the maternity benefit period beyond the job protection period, point toward the importance of job protection in avoiding long-lasting negative effects of expansions in maternity leave coverage. There is some evidence that this reform worsened women's position in the labor market after childbirth. It deterred up to 4% of mothers from returning to work within the first 6 years after childbirth, lowered mothers' labor market income by roughly 8%, and reduced earnings of employed mothers by about 3% 2–6 years after childbirth. Furthermore, the reform caused a decline in mothers' cumulative total income, including that from maternity benefit payments, by almost DM 4,000 6 years after childbirth, although the state government spent approximately DM 6,000 (in 1995 prices) per mother, on average, on additional maternity benefit payments.

These findings are highly relevant for the current debate on the design of social assistance and welfare programs. In particular, the changes in US welfare and tax policy between 1984 and 1996 were designed to encourage work by single mothers, and an important motivation behind the changes was that time away from work may lower women's future labor market attachment (see, e.g., Meyer and Rosenbaum 2001; Blank 2002).

To conclude, the expansions in maternity leave coverage that were implemented in Germany since the late 1970s achieved their goal of increasing the time mothers spend with their infants after childbirth, a time that is crucial for the child's development. However, the expansions failed at improving mothers' labor market attachment and income in the long run, 2–6 years after childbirth.

# Appendix A
# Additional Results

**Table A1**
**Expansions in Leave Coverage and Mothers' Prebirth Characteristics**

| | Age | (Log) Earnings | Education | Full-Time |
|---|---|---|---|---|
| Reform 1: job protection: 2 → 6, maternity benefit: 2 → 6 (May 1979): | | | | |
| February–July, excluding April and May ($N$ = 182,679) | .070 | −.006 | .003 | .001 |
| | (.053) | (.004) | (.020) | (.003) |
| Reform 2: job protection: 6 → 10, maternity benefit: 6 → 10 (January 1986, excluding Baden-Württemberg): | | | | |
| October–March, excluding January and December ($N$ = 171,236) | −.037 | .003 | .046 | .000 |
| | (.055) | (.005) | (.020) | (.004) |
| Reform 3: job protection: 6 → 10, maternity benefit: 6 → 22 (January 1986, Baden-Württemberg): | | | | |
| October–March, excluding January and December ($N$ = 36,025) | .005 | .014 | .005 | .007 |
| | (.114) | (.010) | (.043) | (.008) |
| Reform 4: Job Protection: 18 → 36, Maternity Benefit: 18 → 18 (January 1992, excluding Baden-Württemberg): | | | | |
| October–March, excluding January and December ($N$ = 218,089) | −.086 | −.008 | .011 | .004 |
| | (.056) | (.005) | (.017) | (.004) |
| Reform 5: job protection: 36 → 36, maternity benefit: 18 → 24 (January 1993, excluding Baden-Württemberg): | | | | |
| October–March, excluding January and December ($N$ = 214,868) | −.124 | .004 | .044 | .010 |
| | (.046) | (.004) | (.017) | (.004) |

SOURCE.—IAB Social Security records, mothers who signed up for maternity leave.

NOTE.—The table reports difference-in-difference estimates based on regression (1), using as dependent variables the mother's age at childbirth, as well as her (log) earnings, years of education, and full-time status around conception (i.e., 9 months prior to childbirth). Results refer to our baseline specification and include mothers who give birth 3 months before or 3 months after an expansion in leave coverage. Mothers who give birth 1 month before or 1 month after the expansion in leave coverage are excluded. The control group consists of mothers who give birth in the same months but 1 year before (2 years before for reform 5) or 1 year after (2 years after for reform 4) an expansion in leave coverage. Robust standard errors are in parentheses.

**Table A2**
**Expansions in Leave Coverage and Mothers' Return to Work: Robustness Checks**

| | Reform 1: Job Protection: 2 → 6, Maternity Benefit: 2 → 6 (May 1979) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 3* | 7 | 16 | 28 | 52 | 76 |
| 1. February–July, excluding April and May, no controls (control group: 1 year before/after, $N$ = 182,679) | −.030 | −.020 | −.019 | −.012 | −.010 | −.009 |
| | (.004) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 2. February–July, excluding April and May, controls (control group: 1 year before, $N$ = 113,536) | −.299 | −.018 | −.020 | −.016 | −.011 | −.011 |
| | (.005) | (.004) | (.006) | (.006) | (.006) | (.006) |
| 3. April–May, controls (control group: 1 year before/after, $N$ = 98,730) | −.218 | −.018 | −.012 | −.006 | −.005 | −.004 |
| | (.006) | (.007) | (.007) | (.007) | (.007) | (.007) |
| Corrected | −.311 | −.025 | −.017 | −.009 | −.006 | −.005 |
| 4. November–October, excluding April and May, controls (control group: 1 year before/after, $N$ = 460,347) | −.294 | −.022 | −.016 | −.009 | −.008 | −.006 |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |
| | Reform 2: Job Protection: 6 → 10, Maternity Benefit: 6 → 10 (January 1986, excluding Baden-Württemberg) | | | | | |
| | Months since Childbirth | | | | | |
| | 7* | 11 | 16 | 28 | 52 | 76 |
| 1. October–March, excluding December and January, no controls (control group: 1 year before/after, $N$ = 171,243) | −.276 | −.039 | −.026 | −.020 | −.012 | −.009 |
| | (.005) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 2. October–March, excluding December and January, controls (control group: 1 year before, $N$ = 110,585) | −.278 | −.041 | −.023 | −.017 | −.011 | −.009 |
| | (.006) | (.006) | (.006) | (.006) | (.006) | (.006) |
| 3. January–December, controls (control group: 1 year before/after, $N$ = 90,805) | −.198 | −.033 | −.028 | −.021 | −.008 | −.009 |
| | (.007) | (.007) | (.007) | (.007) | (.007) | (.007) |
| Corrected | −.282 | −.047 | −.039 | −.030 | −.011 | −.012 |
| 4. July–June, excluding December and January, controls (control group: 1 year before/after, $N$ = 456,747) | −.273 | −.057 | −.044 | −.033 | −.023 | −.020 |
| | (.003) | (.003) | (.003) | (.003) | (.003) | (.003) |

**Table A2** (*Continued*)

| | Reform 3: Job Protection: 6 → 10, Maternity Benefit: 6 → 22 (January 1986, Baden-Württemberg) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 7* | 11* | 16* | 28 | 52 | 76 |
| 1. October–March, excluding December and January, no controls (control group: 1 year before/after, $N$ = 36,025) | −.303 | −.091 | −.085 | −.066 | −.044 | −.038 |
| | (.010) | (.011) | (.011) | (.011) | (.011) | (.010) |
| 2. October–March, excluding December and January, controls (control group: 1 year before, $N$ = 23,160) | −.323 | −.111 | −.098 | −.076 | −.055 | −.052 |
| | (.012) | (.013) | (.013) | (.013) | (.013) | (.012) |
| 3. January–December, controls (control group: 1 year before/after, $N$ = 19,089) | −.197 | −.043 | −.046 | −.048 | −.043 | −.037 |
| | (.014) | (.015) | (.015) | (.015) | (.015) | (.015) |
| Corrected | −.282 | −.061 | −.065 | −.069 | −.062 | −.053 |
| 4. July–June, excluding December and January, controls (control group: 1 year before/after, $N$ = 96,993) | −.289 | −.093 | −.086 | −.072 | −.052 | −.040 |
| | (.006) | (.007) | (.007) | (.007) | (.007) | (.006) |
| | Reform 4: Job Protection: 18 → 36, Maternity Benefit: 18 → 18 (January 1992, excluding Baden-Württemberg) | | | | | |
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28* | 40 | 52 | 76 |
| 1. October–March, excluding December and January, no controls (control group: 1 year before, 2 years after, $N$ = 218,089) | −.008 | −.098 | −.087 | −.025 | −.023 | −.009 |
| | (.003) | (.004) | (.004) | (.004) | (.004) | (.004) |
| 2. October–March, excluding December and January, controls (control group: 1 year before, $N$ = 150,067) | −.005 | −.092 | −.087 | −.025 | −.021 | −.008 |
| | (.004) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 3. January–December, controls (control group: 1 year before, 2 years after, $N$ = 118,696) | −.005 | −.074 | −.071 | −.027 | −.025 | −.014 |
| | (.004) | (.057) | (.007) | (.006) | (.006) | (.006) |
| Corrected | −.007 | −.106 | −.102 | −.039 | −.036 | −.020 |
| 4. July–June, excluding December and January, controls (control group: 1 year before, 2 years after, $N$ = 581,264) | −.006 | −.098 | −.090 | −.025 | −.025 | −.009 |
| | (.002) | (.003) | (.003) | (.003) | (.003) | (.003) |

**Table A2** (*Continued*)

| | Reform 5: Job Protection: 36 → 36, Maternity Benefit: 18 → 24 (January 1993, excluding Baden-Württemberg) | | | | | |
|---|---|---|---|---|---|---|
| | Months since Childbirth | | | | | |
| | 7 | 19* | 28 | 40 | 52 | 76 |
| 1. October–March, excluding December and January, no controls (control group: 2 years before, 1 year after, $N$ = 214,868) | −.013 | −.060 | −.039 | −.022 | −.019 | −.012 |
| | (.003) | (.004) | (.004) | (.005) | (.005) | (.004) |
| 2. October–March, excluding December and January, controls (control group: 1 year after, $N$ = 140,282) | −.012 | −.066 | −.040 | −.021 | −.021 | −.013 |
| | (.004) | (.005) | (.005) | (.005) | (.005) | (.005) |
| 3. January–December, controls (control group: 2 years before, 1 year after, $N$ = 117,951) | −.007 | −.050 | −.036 | −.016 | −.014 | −.012 |
| | (.004) | (.006) | (.006) | (.006) | (.006) | (.006) |
| Corrected | −.010 | −.072 | −.052 | −.023 | −.020 | −.017 |
| 4. July–June, excluding December and January, controls (control group: 2 years before, 1 year after, $N$ = 574,858) | −.012 | −.057 | −.031 | −.016 | −.016 | −.005 |
| | (.002) | (.003) | (.003) | (.003) | (.003) | (.003) |

SOURCE.—IAB Social Security records, mothers who signed up for maternity leave.

NOTE.—The table reports robustness checks for the impact of five expansions in leave coverage on the probability that the mother has returned to work by month $t$ since childbirth. The only difference between estimates in rows 1 and our baseline estimates in table 1 is that we do not include mothers' prebirth characteristics as control variables. In rows 2, our control group consists of mothers who give birth 1 year before (1 year after for reform 5) the expansion in leave coverage came into effect, as opposed to 1 year before or 1 year after as in our baseline regressions. In rows 3, we restrict the sample to mothers who give birth 1 month before or 1 month after a policy reform. In order to correct for the attenuation bias due to the measurement error in the child's birthday, we divide our estimates by 0.7, i.e. the share of mothers for whom we correctly measure their child's month of birth; see app. B for details. In rows 4, we widen the estimation sample to mothers who give birth 6 months before or 6 months after an expansion in leave coverage and exclude, as in our baseline specification, mothers who give birth 1 month before or 1 month after an expansion. Robust standard errors are in parentheses.

* These cells represent the short-term effects of the expansions, referring to after the old and before the new leave policy ends.

## Appendix B

### Measurement Error

Consider first the first type of measurement error; that is, not all leave spells are maternity in nature. For ease of exposition, we focus on the 1992 policy reform that extended job-protected leave from 18 to 36 months. For simplicity, we show our results for the simple difference (after vs. before) estimator. Our arguments also apply to the difference-in-difference estimator in equation (1).

Let $Y_i^{\text{true}}$ and $Y_i^{\text{other}}$ denote the labor market outcome of women (which we index by the subscript $i$) who take a leave of absence because of childbirth or for other reasons, respectively. The proportion of women who are on maternity leave because they gave birth is denoted by $p$. Schönberg (2009) shows that this proportion is uncorrelated with the month the leave spell started and is thus uncorrelated with the leave policy to which the mother is entitled. The expected difference between labor market outcomes of women who are observed to take a leave of absence before or after a change in maternity leave legislation (e.g., between October 1991 and March 1992) equals

$$\begin{aligned} E[Y_i|\text{ML} = 36] - E[Y_i|\text{ML} = 18] \\ = p(E[Y_i^{\text{true}}|\text{ML} = 36] - E[Y_i^{\text{true}}|\text{ML} = 36]) \\ + (1 - p)(E[Y_i^{\text{other}}|\text{ML} = 36] - E[Y_i^{\text{other}}|\text{ML} = 36]). \end{aligned}$$

If labor market outcomes of women who take a leave of absence for reasons other than childbirth are unaffected by the expansion in leave coverage, that is, if

$$E[Y_i^{\text{other}}|\text{ML} = 36] = E[Y_i^{\text{other}}|\text{ML} = 36],$$

this simplifies to

$$\begin{aligned} E[Y_i|\text{ML} = 36] - E[Y_i|\text{ML} = 18] \\ = p(E[Y_i^{\text{true}}|\text{ML} = 36] - E[Y_i^{\text{true}}|\text{ML} = 36]). \end{aligned}$$

Using the IABS 75–95 Plus, Schönberg (2009) shows that this assumption holds and that $p \approx 0.9$. Hence, this type of measurement error leads to an attenuation bias of approximately 10%.

Next, consider the second type of measurement error, that is, the mismeasurement in the maternity leave legislation the mother is entitled to, driven by the mismeasurement in the child's month of birth. For simplicity, we ignore the first type of measurement error. Let $q$ denote the probability that the true maternity leave policy to which the mother is entitled is equal to the leave policy we observe in the data. Schönberg (2009) shows that this probability is largely uncorrelated with the month

the mother gives birth and thus with the maternity leave policy. The expected difference between labor market outcomes of women who are observed to give birth before or after the change in legislation in the data equals

$$E[Y_i|\text{ML} = 36] - E[Y_i|\text{ML} = 18] = (2q - 1)(E[Y_i^{\text{true}}|\text{ML} = 36] - E[Y_i^{\text{true}}|\text{ML} = 36]).$$

The proportion of women for whom we correctly assign the leave policy depends on the sample restrictions. If the sample is restricted to mothers who give birth within 1 month of the policy reform, $q \approx 0.85$, leading to an attenuation bias of about 30%.[22] If mothers who give birth within 1 month of the policy reform are excluded from the sample, $q \approx 0.975$, leading to an attenuation bias of approximately 5%.

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[22] This number is derived as follows. According to the IABS 75–95 Plus, we measure the child's month of birth correctly with probability .7. The probability that the mother gives birth before the child's observed month of birth is roughly equal to the probability that the mother gives birth after the child's observed month of birth. Hence, the probability that a woman whom we observe to give birth in December 1991 is entitled to 18 months of leave coverage is .7 (i.e., the probability that we measure her child's month of birth correctly) + .15 (i.e., the probability that the mother has given birth before December 1991) = .85.

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