The Effects of Maternity Leave Extension on Training for Young Women

Patrick A. Puhani*
Katja Sonderhof[+]

Leibniz University of Hannover; SIAW, University of St. Gallen; ERMES, Université Paris II; IZA, Bonn

[+] **Leibniz University of Hannover**

January 2008

First Version

Corresponding author:

Patrick A. Puhani		*Katja Sonderhof*	
Leibniz University of Hannover		*Leibniz University of Hannover*	
Institut für Arbeitsökonomik		*Institut für Arbeitsökonomik 1*	
Königsworther Platz 1		*Königsworther Platz 1*	
D-30167 Hannover		*D-30167 Hannover*	
Germany		*Germany*	
Phone:	*++49 – 511 – 762-5620*	*Phone:*	*++49 – 6151 – 16-5657*
Fax:	*++49 – 511 – 762-8297*	*Fax:*	*++49 – 6151 – 16-8297*
E-Mail:	puhani@aoek.uni-hannover.de	*E-Mail:*	sonderhof@aoek.uni-hannover.de

Abstract: Using four representative individual-level datasets for West Germany, we estimate the effect of the extension of maternity leave from 18 to 36 months on young women's participation in job-related training. Specifically, we employ difference-in-differences identification strategies using control groups of older women, young men, and older women together with young and older men, and provide separate results for white-collar workers and different training categories like longer training programs and employer-arranged training. We also report placebo results using the same estimation strategies for a period without any change in maternity leave. We find that maternity leave extension negatively affects job-related training for young women, even if they have no children, especially when the focus is on longer training, employer-arranged training, and white-collar workers. Admittedly, the point estimates, albeit statistically significant, are subject to large standard errors; nevertheless, the contrast between these estimates and the placebo results suggest that our findings are economically important.

JEL classification: J16, J24, J58, J83
Keywords: policy, evaluation, education

Acknowledgements: This research was supported by German Research Foundation (DFG) within the project 'Labour Market Effects of Social Policy' which is part of the research initiative 'Flexibility in Heterogeneous Labour Markets'. We are grateful to seminar participants at the Universities of Darmstadt and Hohenheim and at the research initiative's IAB meeting in Nuremberg for helpful comments. All remaining errors are our own.

1. Introduction

Most industrialized countries have some form of maternal leave policy that effectively grants employment protection to women around childbirth. Arguments in favor of this employment protection refer to the well-being of both young children and their mothers. From a labor perspective, employment protection through maternity leave might increase the attachment of mothers to their employer or the labor force in general. However, it may also have the opposite effect in that maternity leave combined with maternity benefits can be seen as a subsidy to leave the labor market temporarily with potential long-term consequences.

Whereas previous studies on maternity leave with employment and wages as outcome variables have frequently discussed the role of human capital accumulation and depreciation, we know of no study relating human capital investments like training directly to maternity leave.[1] Therefore, in this paper, we estimate the effect of prolonged maternity leave on the human capital investments of women of working and childbearing age. To this end, we exploit the natural experiment of a 1992 extension in the employment protection (maternity leave) period in Germany from 18 to 36 months, which propelled Germany to the top position in the ranking of legislatively mandated maternity leave durations among industrialized countries.[2] To assess the effect of this reform on the human capital investments of young women workers, we draw on four individual-level datasets, all of which ask information on job-related training for women and men of different age groups.

It is well-established empirically that women are generally less attached to the labor force than men and that they receive less job-related training. For example, Barron, Black and

[1] Present discounted value of earnings, of which wage profiles and employment histories are major ingredients, might be the most appropriate outcome variable for the financial impact of maternity leave. However, measurement of the impacts on overall lifecycle wage and employment profiles is complicated by the frequent lack of long panel data. Conversely, impacts on wages at a certain point in the lifecycle may fail to take account of effects like steepened wage profiles. For example, when women have to bear a higher share of the costs of firm-specific training because of extended maternity leave, their early-career wages may fall, although Hashimoto's (1981) model would predict that they will also reap a higher share of the returns later in their careers. Thus, without data on lifecycle wage profiles, estimates with wages as the outcome might be difficult to interpret.

[2] See http://www.childpolicyintl.org/issuebrief/issuebrief5table1.pdf

Loewenstein (1993) show that U.S. workers with weaker attachment to the labor market are allocated to jobs offering less training, while women are employed in positions associated with shorter durations of job-related training. Similarly, Royalty (1996) finds a significant relationship in the U.S. between the predicted probability of job turnover and the probability of receiving training. Thus, the fact that women change their job positions more frequently accounts for about one fourth of the gender gap in training. For Britain, Green (1991) analyzes the differences in job-related training between young women and young men and between older women and older men. In comparison to young men, young women have less than half the chances of receiving training, although no differences are found between older women and older men. Pischke (2001) also reports lower training incidence for women than for men in Germany. Although these studies do not explicitly relate maternity leave to the incidence of training for women, they implicitly raise the question of whether prolonged maternity leave might affect job-related training for young women. The effect on training might be negative because a very long maternity leave reduces a young woman's labor market attachment, at least for the duration of the leave. As a consequence, employers should be less likely to invest in young women's human capital. Theoretically, the opposite effect might also prevail: if employers are forced to reemploy a woman even after a long leave, they might make the best of the situation and make up for lost human capital through intensified training.

Previous research has analyzed the relationships between both maternity leave and labor force participation and maternity leave and wages. For instance, Waldfogel (1999) finds no negative effects for the Family and Medical Leave Act's (FMLA) introduction of a 12-week maternity leave on the wages or employment of young women. Hashimoto et al. (2004) also find the effects to be negligible. Indeed, Waldfogel (1998) suggests that maternity leave may even increase young women's employment and wages, a finding corroborated by Zveglich and van der Meulen Rodgers's (2003) investigation of a similar reform in Taiwan that introduced an 8-week maternity leave. Nevertheless, these findings contrast with those of

Lai and Masters (2005) for Taiwan, as well as with Gruber's (1994) finding of a negative effect on wages of variations in maternity benefits across the U.S. They also contrast with the results of European studies that use reforms or other control group designs with longer maternity leave periods (up to three years). Among these, Ondrich et al. (2003) and Lalive and Zweimüller (2005), based on data from Germany and Austria, respectively, find that extended maternity leave results in short-run reductions in labor supply, while Schönberg and Ludsteck (2007) estimate negative long-run effects on wages in Germany. Likewise, in an analysis of policy variation in a panel of European countries, Ruhm (1998) reports increased employment due to parental leave (de facto maternity leave) but lower wages.

The remainder of this paper is organized as follows. Section 2 provides an overview of maternity leave regulations in Germany, especially with respect to the 1992 reform investigated here. Section 3 describes the datasets and the research design, after which Section 4 presents the difference-in-differences estimates of the effects of maternity leave extension on job-related training for women of child-bearing age. Overall, these estimates show that the extension reduces training for young women, even those who have no children, especially once the analytical focus is narrowed to longer training courses, employer-arranged training, and white-collar workers in firms with more than 20 employees. Section 5 concludes the paper.

2. Maternity Leave in Germany

The duration of maternity leave as guaranteed by law in Germany exceeds that of other industrialized countries. For example, only since 1993 have U.S. federal regulations given women the right to take a 12-week maternity leave from work, even though many firms previously had their own maternity leave schemes. In contrast, as early as 1952 Germany enacted the first law protecting mothers (Mutterschutzgesetz) with a mandated 12-week maternity leave, which was extended in 1965 to 14 weeks (i.e., six weeks before and eight weeks after the predicted birth date). In 1979, this maternity leave duration was extended to an optional additional four months (decided on by the mother), and since 1986 the government has repeatedly increased the maximum duration of maternity leave (see Table 1), with the largest increase being the 1992 extension of the maximum duration from 18 to 36 months.[3]

One intention of policy makers when increasing the maximum maternity leave duration was to protect women from unemployment following the birth of a child. Another was to improve the welfare of children. Since public childcare facilities for children younger than three years of age are not generally available in Germany (having only recently gained broader political support in the western part of the country), all women should be given the opportunity to care for their children for up to three years.

By law, women also have the right to a job with their previous employer following maternity leave, not necessarily the same job but one comparable to that held before the leave. Nevertheless, not all women take this opportunity to return to the labor force. For example, Ondrich et al. (2003) and Weber (2004) find that a longer duration of maternity leave has a negative impact on the probability of women returning to the labor market, a finding also reported by Lalive and Zweimüller (2005) for Austria. For the U.S., Klerman and Leibowitz (1990) show that because of better childcare facilities and less maternity leave protection, mothers return to the labor market sooner than in the past. Similarly, Waldfogel and Berger (2004) report that more than 80% of U.S. women working before childbirth return to work within 12 months after childbirth, while 55% return within 12 weeks after childbirth. In Germany, however, only around 55% of all women working before a first birth return to the labor market within 24 months (Gustafsson et al., 1996).

[3] Since 1986, fathers have also been allowed to take part of the leave, but, according to the Federal Ministry of Families, Seniors, Women and Youth, only 1.5 percent of fathers make use of this opportunity.

Figure 1 shows calculations of the average maternity leave durations for women working before childbirth based on biographical information from the German Socio-Economic Panel (GSOEP). In the first graph, we calculate the average period out of the labor force due to childbirth by adding the duration of formal maternity leave to the number of months after the leave until a mother was reemployed. In the second, we plot the average duration of maternity leave taken by mothers who return to work directly when the official maternity leave ends. The difference between the two lines is driven by the fact that in Germany many mothers stay at home with their children for many years, even after their maternity leave entitlement has run out. It should also be noted that we have very few observations (between 10 and 70 per year), so the numbers shown here have high sampling variance.

For both graphs, we have censored all durations at 36 months (the maximum maternity leave duration in Germany since 1992) because we are only interested in how far maternity leave extension drives career breaks up to that limit. As it turns out, maternity leave extension is associated with an increase in average career break durations due to childbirth. Keeping in mind the sampling variance, career break durations increased from around 20 months in the late 1980s to around 25 months in the early 1990s. If we only consider mothers whose attachment to the labor force is suggested by their returning to work directly following the official maternity leave (which may be for shorter periods than the legal limit), we observe a sharper increase in career breaks due to maternity leave, from around 5 to 10 months in the 1980s to between 15 and 20 months (and over 25 months in one estimate) in the 1990s. Moreover, the pattern in the curve of Figure 2, which outlines the increase in the share of time spent in official maternity leave (excluding post-leave career breaks) by young women aged 20 to 35, is similar to that showing the length of maternity leave. This figure also plots the development of fertility, which has declined somewhat but not dramatically over the last two decades, meaning that the extension of maternity leave has seemingly had no overwhelming effect on birth rates.

Thus, despite Schönberg and Ludsteck's (2007) finding that post-leave labor force attachment remains unaffected by leave extension, the Figure 1 statistics suggest that, ceteris paribus, mothers' labor force attachment decreases through the direct effect of maternity leave extension, especially in those women who return to the labor force within the first three years after childbirth. As it is difficult for employers to predict who will become a mother and when, all else being equal, the extension of the leave period has probably decreased the expected job attachment of all female employees at childbearing age, even though, as discussed later in Section 3, other factors besides maternity leave expansion might be impacting the labor supply of young women.

The literature also indicates that job-related training is likely to at least partly entail investment in firm-specific human capital. Theoretical results in Becker (1962) and Hashimoto (1981) raise the hypothesis that the reduction in young women's job attachment due to prolonged maternity leave will decrease firms' willingness to invest in job-related training for women of childbearing age (or at least reduce their willingness to bear the costs). Likewise, young women's willingness to invest in job-related training may also decrease due to a reduction in expected returns to that investment. We thus evaluate the impact of extended maternity leave on the incidence of job-related training for young women empirically.

3. Data and Methodology

The Treatment Group and Data Sets

From the employer's perspective, extension of the maternity leave period constitutes an increase in employment protection for women of childbearing age. That is, if increased protection rights for young women are not reflected in implicit or explicit contracts that compensate employers for young women's extended maternity leave, women of childbearing age can expect diminished employment opportunities, such as less job-related training (cf. Lazear, 1990). However, unlike Schönberg and Ludsteck (2007), who consider extended maternity leave a treatment for mothers only and use mothers subject to shorter maternity leave as controls to measure labor force participation and wages as outcomes, we are interested in the existence of extended maternity leave rights as a treatment that affects all women of childbearing age with job-related training as an outcome of that treatment. Therefore, in our research design, the treatment group consists of all women of childbearing age, defined as those between 20 and 35 years of age. We exclude women between 36 and 39 because we cannot tell whether or not an employer perceives these women as being of childbearing age.

In the subsequent analysis, we draw on four individual-level datasets that represent the West German workforce; East Germany was excluded because at the time of the reform, it was experiencing a major transition whose related factors are difficult to filter out from the effect of the maternity leave extension. In addition, the prereform points of observation are mostly from the 1980s when East Germany was under communist rule and thus excluded from the data.

We also restrict the sample to persons who are currently employed and hence attached to the labor market because by definition, persons not working cannot receive job-related training. Hence, we ignore the potential effect of extended maternity leave on training that works directly through (temporarily) reduced labor supply in order to focus on the effect for young women attached to the labor market (and thus potentially interested in job-related training). Nevertheless, because the different datasets measure the incidence of past job-related training for between 1 and 5 years, we cannot avoid capturing some of the potential direct effect through the reduced labor supply that results from maternity leave. However, because the sample includes only employed persons, any breaks in the labor supply in previous years that imply no job-related training at that time might have been compensated for by catch-up effects on reemployment. Hence, the potential effect of maternity leave on job-related training that works directly through reduced labor supply need not necessarily bias our estimates downward (in the sense of indicating less training for young women).

The four datasets used are the German Socio-Economic Panel (GSOEP),[4] the Micro Census (Mikrozensus, MZ),[5] the Report System [on] Further Education (Berichtssystem Weiterbildung, BSW),[6] and the Qualification and Careers Survey (Qualifikation und Berufsverlauf, IAB-BIBB).[7] The choice of datasets is driven by information on job-related training at the individual level both before and after the maternity leave extension of 1992. Because the treatment group comprises all women of childbearing age, actual information on maternity leaves was not required for a dataset to be used here.

Nevertheless, problems did arise in the dataset comparison. First, all four datasets measure the outcome variable, job-related training, for a different period of time: the last five years in the IAB-BIBB data, the last three years in the GSOEP, the last two years in the MZ, and the last 12 months in the BSW. The second difficulty stemmed from the needs of our difference-in-differences analysis (see below). Not only does it require training incidence observations before and after the maternity leave extension, but these can only be done properly by focusing on the most drastic reform, that which lengthens maternity leave from 18 to 36 months. However, the post-1992 reform surveys differ enormously in timing: 1994 for

---

[4] The GSOEP is probably the most frequently used individual-level data set for Germany. For more information, see http://www.diw.de/english/soep/29012.html

[5] This Micro Census (MZ) is a one-percent sample of the population (the scientific community receives only a 70 percent sample of that one percent) and asks similar questions to a census. For political reasons, there has been no census in Germany since 1987, so the Micro Census acts as a substitute. For more information, see http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/press/abisz/Mikrozensus__e,templateId=renderPrint.psml

[6] This survey was conducted seven times between 1979 and 2003 by the Federal Ministry for Education and Research (*Bundesministerium für Bildung und Forschung*). More information on these data is available from the Central Archive for Empirical Social Research, University of Cologne web site: http://info1.za.gesis.org/DBKSearch12/SDesc.asp

[7] The Qualification and Careers Survey (IAB-BIBB), which specializes in job descriptions, was also used by DiNardo and Pischke (1997) and Spitz-Öner (2006). More information is available at http://www.gesis.org/Datenservice/Themen/38Beruf.htm

the BSW, 1995 for the MZ, 1998 for the IAB-BIBB, and 2000 for the GSOEP.[8] Variation also exists in the timing of the pre-1992 reform surveys, which refer to the following years: BSW, 1988; GSOEP and MZ, 1989; and IAB-BIBB, 1991. Obviously, these differences must be taken into account. For example, by asking for training in the five years previous to 1991, the prereform survey refers to a period during which three smaller extensions of maternity leave benefits occurred. The surveys also differ in their sample sizes, with the largest, the MZ, containing over 100,000 observations per wave in the gender-age groups studied, followed by the IAB-BIBB with more then 16,000 observations per wave. In contrast, the GSOEP and BSW are much smaller, the former with over 3,000 observations in 1989 but more than 5,000 in 2000 because of refreshment samples, and the latter with over 2,000 observations per wave.

We measure the incidence of job-related training in all four datasets. Despite differences in the size of the event window referred to by the various surveys, the BSW, GSOEP, and the IAB-BIBB exhibit a large degree of communality in training incidence, with training participation in the first two varying between a quarter and a third (see Table 2). In the IAB-BIBB data, participation is somewhat higher (between a third and almost one half) because this survey asks for training during the previous 5 years (compared to 1 year in the BSW and 3 years in the GSOEP). Clearly distinct from these three datasets is the MZ, in which training incidence is only 14 and 18 percent in 1989 and 1995, respectively. Given that the MZ asks about the previous 2 years, this low incidence relative to the BSW cannot be explained by the size of the event window. Indeed, examination of the original survey questions throws no light on why the training incidence recorded by the MZ is so low.[9]

[8] The GSOEP has been conducted since 1984, but questions on training started in 1989 and were only repeated in 1993, 2000, and 2004. We do not use 1993 because in asking for training during the last three years, this wave barely covers the 1992 reform. The IABB-BIB data were collected only four times, 1979, 1985, 1991, and 1998; the BSW data are available for 1979, 1988, 1991, 1994, 1997, 2000, and 2003; and even though the MZ is an annual survey, we only have consistent information on training for 1989, 1991, 1993, and 1995.

[9] Differences in training intensity between German datasets are described in detail in Kuckulenz (2006). The major problem, however, is no clear definition of job-related training: the training questions are variously constructed and placed in more or less prominent positions in the survey.

As Table 2 shows, all datasets report an increase in training participation over time, a finding that holds true for all age-gender groups. Moreover, consistent with the growing emphasis on lifelong learning, training participation increased more among older (aged 40–55) than younger workers (aged 20–25). Formal testing of these before-after comparisons is carried out in Section 4.

Potential Control Groups

In tracking the development of job-related training of young women before and after the increase in the maternity leave period, we consider three demographic groups as reference points to construct control group designs: young men of similar age to the treatment group (20–35), women aged 40–55 years, and men aged 40–55. [10] We exclude persons older than 55 years from all analyses because this group's outcomes may be affected by other factors like early retirement, which may evolve differentially between men and women. In addition, training is less important to the older worker because the closer the retirement age, the lower the returns to investment.

Before comparing changes in training participation before and after the maternity leave extension for different age-gender groups, we check whether the extension of the maternity leave period did indeed lower young women's labor market attachment in relation to the potential control groups. This assessment is important because theory suggests that labor market attachment may be a key determinant of employers' willingness to support job-related training (Hashimoto, 1981). Likewise, observation of young women's labor force participation is important because general trends in female labor force participation may overlap with the effects of maternity leave on labor force participation and thus also influence job-related training. Hence, we must show an association between the German government's

[10] Similar treatment-control group designs are used in Gruber (1994), Ruhm (1998), Waldfogel (1999), and Lai and Masters (2005).

extension of maternity leave duration and a decrease in young women's labor force participation relative to the control group. As Figure 1 has already shown, for young mothers, actual maternity leave periods have increased.

Figure 3 to Figure 5 profile the development of the full time equivalent (FTE) labor force participation rates of our treatment group (young women, irrespective of whether they are mothers) in relation to various controls. Because we restrict our sample to employees, self-employed are excluded; however, the graphs are robust to the inclusion of self-employed workers. We expect no abrupt change in labor market participation owing to maternity leave extension because hesitation to exploit the extended leave to its full extent is quite plausible in the face of uncertainty about how the employer will deal with this new situation. This view is borne out by the gradual increase in the average maternity leave period exhibited in Figure 1 and Figure 2.

Figure 3 shows the full time equivalent (FTE) labor force participation of young women relative to the older women controls. Even though the GSOEP's smaller sample size results in more erratic results than the MZ data, both datasets suggest that young women's labor force participation has decreased over the last two decades relative to that of older women. It should also be noted that the more reliable evidence from the MZ data suggests a much deeper decline in young versus older women's labor force participation in the late 1980s and early 1990s; that is, exactly during the period when maternity leave duration was massively extended (from 6 to 10 months in 1986, 12 months in 1988, 15 months in 1989, 18 months in 1990, and 36 months in 1992). This decline in relative participation is sizeable, at about 5 percentage points between the 1980s and 1993 according to the MZ. This steep downward trend flattens in the mid-1990s, although it remains negative despite no further reforms to maternity leave.

Figure 4 presents a comparison between young women and young men. Although the labor force participation of the former is lower than that of the latter, young women have seemingly been catching up over time. Nevertheless, the MZ data clearly suggest that the long-run trend in catching up with young men stalled after 1992 (when the maternity leave period was doubled from 18 to 36 months) until about 2000. Hence, the short time series presented here is consistent with a permanent reduction in the labor force attachment of young women relative to their male peers. Taking into account that this reduction overlaps with an upward trend that dominates the data, we expect no decrease in young women's job-related training relative to young men. On the contrary, an increase is to be expected. However, this increase should be smaller than the one later estimated for a postreform placebo period (see the end of Section 4), when the young women's catchup rate (relative to young men) returned to the prereform trend, which, as Figure 4 suggests, had temporarily been attenuated.

The third alternative for the control group design compares the young women to older women and relates this difference to young versus older men. Consequently, Figure 5 depicts the difference in the differences of FTE labor force participation rates between young and older women and young and older men. This development is similar to that for the older women control group: young women's labor force attachment declines relative to older women, and the gap between young and older women declines in relation to the gap between young and older men. This pattern holds true during the period of maternity leave expansion and in the years after 1992 until the (positive) difference between these two gaps remains constant or even increases again from the late 1990s onwards. Therefore, we expect a decrease in the relative incidence of job-related training for young women with this control group design.

Based on the control group design just presented, we estimate three sets of regression equations. The first is an estimate of the difference in training incidence between young and older women before and after the 1992 reform:

$$training_{it} = \alpha + \beta_1 X_{it} + \beta_2 after_{it} + \beta_3 young_{it} + \tau_1 (young_{it} \times after_{it}) + \varepsilon_{it} \qquad (1)$$

where training is an indicator variable that is equal to 1 if training has occurred. Young and after are dummy variables indicating whether a women is young (20 to 35 years) and whether an observation refers to a post-1992 time point. The vector X denotes other control variables. In this difference-in-differences setup, the effect of interest is τ_1, which we expect to be negative because of the relative labor supply developments shown above. If we have panel data (as in the GSOEP) instead of repeated cross sections (as in the other three datasets), we adjust standard errors for clustering (Bertrand, Duflo and Mullainathan, 2004). The model is analogous when young men are chosen as controls:

$$training_{it} = \alpha + \beta_1 X_{it} + \beta_2 after_{it} + \beta_3 female_{it} + \tau_2 (female_{it} \times after_{tt}) + \varepsilon_{it} \qquad (2)$$

It should be noted that we expect τ_2 to be positive, given that, as shown in Figure 4, young women have been catching up with young men in terms of (FTE) labor force participation. If older women and young and older men are used as controls, we estimate a difference-in-difference-in-differences model using the following equation:

$$\begin{aligned} training_{it} &= \alpha + \beta_1 X_{it} + \beta_2 after_{it} + \beta_3 female_{it} + \beta_4 young_{it} \\ &\quad + \beta_5 (female_{it} \times young_{it}) + \beta_6 (female_{it} \times after_{it}) + \beta_7 (young_{it} \times after_{it}) \qquad (3) \\ &\quad + \tau_3 (female_{it} \times young_{it} \times after_{it}) + \varepsilon_{it} \end{aligned}$$

with τ_3 as the coefficient of interest, which, as argued above, is expected to be negative. The regression results are presented below.

4. Results

We formalize the comparison of changes in training incidence in providing before-after estimators for the four age-gender groups: young women as the treatment group and older women and young and older men as the controls (see Table 3). Here, as in the subsequent difference-in-differences estimates, we report results for four types of specifications. First, as would be appropriate if the before-after comparison was not confounded by any compositional effects or if any compositional effects were the outcome of extending the maternity leave period, we use no control variables (e.g., if young women invested less in education, education would be endogenous and thus should not be controlled for). We then successively increase the set of control variables in specifications 2 through 4, first by including dummy variables for education (i.e., high school diploma/A-level/Abitur and a tertiary polytechnic or university degree) and then controlling for age and age squared to account for possible changes in the age distributions within groups.[11] In specification 3, we also add job characteristics using dummy variables for full-time, white-collar, and civil servant employment. Finally, specification 4 incorporates dummy variables for civil status (i.e., for being married and having children). Thus, those variables most likely to be endogenous are included last in the four specifications. In other words, we believe that family status and children might be affected by extended maternity leave, whose original intention was to facilitate women's worklife–family balance in order to increase fertility. If so, the civil status variables should not be included among the controls. Similar arguments might apply to the occupational and educational variables, but probably to a lesser extent. In fact, as Table 3 shows, control variables have no large influence on the estimates in any of the datasets. Rather, the results confirm that even when education, occupation, and civil status are held

[11] It turns out that controlling for age and age squared has only a minor impact on the estimates.

constant, job-related training tends to increase over time. Nevertheless, this finding does not hold true for all age-gender groups in all datasets.

First, according to the BSW data, the smallest increase in training incidence between the 1988 and 1994 surveys (referring to training in 1987 and 1993, respectively) is among young women. That is, the point estimate in specification 4 exhibits an increase in training participation of 5.7 percentage points, significant only at the 10 percent level, compared to a 6.1 percentage point estimate for young men, significant at the 5 percent level. The point estimates for older women and men are even larger and highly significant, at 8.8 and 10.1 percentage points, respectively. This result seems in accordance with the hypothesis that the extension of maternity leave has reduced training incidence for young women in relation to young men and older women. However, the difference in the point estimates between young women and men is rather small and not statistically different from zero.

In addition, when we compare the BSW results with the other three datasets, they turn out not to be robust (see Table 3). Indeed, results for the MZ, GSOEP, and IAB-BIBB datasets suggest a higher increase in job-related training for young women than for young men, although only the MZ estimates are statistically significant. Moreover, in light of the trend of an increased labor supply of young women relative to young men (see Figure 4), the finding that young women are catching up with young men in terms of training participation is not surprising.

On the other hand, one robust finding across datasets is that young women experienced smaller increases in training intensity relative to older women. Only in the case of the MZ data is this difference rather small; in the other datasets, it is somewhat large. Nevertheless, in all four datasets, the point estimates for men also suggest that older men increased their training incidence by more than did young men. Hence, it is unclear whether the difference between young and older women is related only to a general tendency of older workers to obtain more training or whether, as the timing of the fall in the relative labor supply of younger versus older women would suggest, it is related to the extension of the maternity leave period. We return to this issue in our difference-in-difference-in-differences estimates below, in which we compare the changes in the gap between young and older women and young and older men.

Table 4 presents the difference-in-differences estimates for the four datasets with older women as the control group. As argued in connection with relative labor supply developments (see Section 3), we expect young women to lose in terms of training incidence relative to older women because of the (accelerated) decrease in their labor supply after maternity leave was extended. The point estimates in Table 4 generally confirm this hypothesis, and the findings are statistically significant for three of the four datasets (the MZ, GSOEP, and IAB-BIBB). As was the case with the before-after estimates, there is hardly any variation in the estimates across specifications with different control variables, but variation across datasets is large. For example, for specification 4, which has the largest set of control variables, the point estimates are -3.3, -0.9, -13.5, and -10.0 percentage points for the BSW, MZ, GSOEP, and IAB-BIBB datasets, respectively.

Additionally, because average training participation differs between datasets (it is especially low in the MZ data), we also provide estimates of the change in training participation for young women relative to the prereform level. The resulting estimates imply a relative decline in training participation by 13, 6, 38, and 30 percent in the BSW, MZ, GSOEP, and IAB-BIBB datasets, respectively. Especially large and significant are the estimates in those datasets that refer to a longer event window, such as training in the previous 3 and 5 years (the GSOEP and IAB-BIBB, respectively). As pointed out previously, the longer the event window, the more the estimates may be biased downward in that they include the direct effect of prolonged maternity leave on job-related training through temporary reduction of the labor supply due to maternity leave. Moreover, although the BSW, which only refers to the previous year, also suggests a large effect (a 13 percent reduction in job-related training for young women), the coefficient estimate is not significant. Therefore, we interpret these estimates as only tentative evidence that extended maternity leave reduces the incidence of job-related training for young women.

As already discussed in relation to labor supply (see Figure 4), findings for the second control group, young men, indicate that young women have been catching up with young men despite extended maternity leave. Thus, we also expect young women to have caught with to young men in job-related training, a hypothesis confirmed in Table 5 in which the estimates of τ_2 are either positive or insignificantly different from zero. Specifically, the point estimates range between -1.7, 1.8, 4.2, and 1.2 percentage point changes in training participation for young women relative to young men in the BSW, MZ, GSOEP, and IAB-BIBB data, respectively. However, only the MZ estimate is statistically significant.

In a third set of estimates using older women and young and older men as controls, we use a difference-in-difference-in-differences strategy to compare the changes in training incidence of young versus older women in relation to the changes of young versus older men. Based on the relative labor supply behavior reported earlier (see Figure 5), we expect negative estimates for τ_3, a hypothesis confirmed by all point estimates except those for the MZ data (see Table 6). For the BSW, MZ, GSOEP, and IAB-BIBB datasets, respectively, the point estimates suggest a -1.3, 1.8, -5.5, and -1.2 percentage point change in young women's training participation. Again, as in Table 5, only the MZ estimates are statistically significant.

Results for White-Collar Workers

The above estimates consider all workers in the respective age groups. Yet, as Table 7 demonstrates, job-related training is much more common among white-collar than among blue-collar workers (e.g., 33 versus 12 percent in the 1988 BSW survey). Among white-collar workers, training participation is higher in larger than in very small firms (35 versus 21 percent in the 1988 BSW survey), perhaps because the latter find it more difficult to substitute for workers who are currently in training. Hence, maternity leave reform should be more likely to have an impact on a group of workers with a high training incidence. We thus restrict the sample to white-collar workers in firms with more than 20 employees to see whether the estimates for this subsample are more pronounced than those for all workers. Unfortunately, the information on firm size varies between datasets so that in the IAB-BIBB data, the firm-size limit must be set to 10 instead of 20 employees, and in the MZ, we have no information on firm size and hence must focus on white-collar workers in all firms. In the BSW and GSOEP data, however, we are able to limit the sample to white-collar workers in firms with at least 20 employees.

Estimates for the subsamples are reported in Table 8 and compared with those for the full samples, which are repeated in the table. Only the results for the full set of control variables are given. In the vast majority of cases, the effect of maternity leave extension on young women's training participation appears more negative for white-collar young women in large firms than for young women in general. For the GSOEP, the estimate of the change in the difference in the training gap between young and older women and that between young and older men is now statistically significant at the 10 percent level (point estimate: -13.7 percentage points). However, the corresponding estimate for the MZ data is still significantly positive. Hence, although the estimates for the subsample give somewhat stronger support to the hypothesis that maternity leave extension may reduce job-related training for young women, the evidence is not conclusive.

In addition, the above investigation of the impact of maternity leave reform on the incidence of any job-related training makes no distinction between lengths or types of training, which, unlike schooling, is poorly classified in most surveys. Nevertheless, unlike the other three datasets, the MZ data does provide information on training duration, whereas BSW data has information on whether training entailed any direct financial costs for the participants and whether it was arranged directly by the employer (information lacking in the other datasets).[12] We therefore apply the same estimates as above but distinguish between different types of training.

Different Lengths of Training

Although length of training is specifically addressed in the MZ, it should be noted that in the previous analysis we did not distinguish between, for example, a one-day course and a one-year trainee program. Therefore, we now analyze training incidence for (a) all types of job-related training, (b) training that lasted for at least one month, and (c) training that lasted for at least six months (see Table 9). Whereas in the 1989 survey, 14 percent of respondents indicated having received some kind of training, once we consider only training that lasts longer than one month, the share drops down to 6 percent and then down to 3 percent if we count only training that lasts longer than 6 months. Hence, most training is short-term.

Table 10 summarizes the difference-in-differences estimates for these three types of training in the same three control groups as above. The table reports two blocks of estimates, one for the full sample and one for white-collar workers only. The first line of the two blocks repeats the results shown previously; the second and third lines display the estimates for participation in longer training courses.

If we only count participation in training longer than 1 or 6 months, the estimates with older women as the control group become more negative and larger in relative terms. The point estimates for the other two control groups are either close to zero (with young men as controls) or negative (older women and young and older men as controls), but in both cases they are insignificantly different from zero. In other words, although young women have caught up with young men in labor force participation, their participation in long training courses has not increased relative to young men during the period following the extension of

[12] The GSOEP provides information on these training aspects, but the questions are inconsistent across the years.

maternity leave duration. On the contrary, relative to older women, it has decreased. It should also be noted that the seemingly small point estimates for all young women (-0.4 percentage points) and for young white-collar women (-0.5 percentage points) compared to older women are significant in size relative to training participation before maternity leave extension. Specifically, they imply a sizable 10 percent reduction in participation in training courses lasting longer than 6 months. Moreover, despite being smaller and insignificant in the last column (when the change in the gap between age groups is compared for women and men), they remain negative.

The Role of the Employer

Only the BSW data provide information on the role of the employer in job-related training, which so far has been subsumed into one category. Therefore, we calculate separate estimates for job-related training that entails no costs to participants and a third set of estimates for job-related training arranged directly by the employer (rather than on the employee's own initiative). The incidence of the three types of training for the four age-gender groups in the BSW is reported in Table 11. Whereas in the first year of observation (1988), 25 percent of all workers in the sample received some type of job-related training, only 19 percent attended training that entailed no cost to participants and only 14 percent received training arranged by the employer.

Table 12 shows estimation results for these three types of training using the same control group designs as before. Again, we report two blocks of estimates, one for the full sample and one for white-collar workers in firms with more than 20 employees. The fact that only a few estimates are statistically significant may be due to the sample size being much smaller than that for the MZ; however, it should be noted that all the point estimates are still negative.

In almost all cases, the more the definition of training is restricted, the greater the increase in the relative point estimates (i.e., in relation to the respective training incidence in 1988). For employer-arranged training, the point estimates indicate a reduction in young women's training participation that ranges between 4.8 and 6.9 percentage points depending on the control group. For young white-collar women, these estimates are larger, between 8.5 and 15.7 percentage points. In relation to the training incidence before maternity leave extension, these point estimates are huge, implying a reduction in employer-arranged training of between 38 and 53 percent for all young women and between 50 and 92 percent for young white-collar women in firms with more than 20 employees. Even though we must not overemphasize these large numbers because of the large standard errors attached to them, it should be noted that once we narrow down the definition of training, the point estimates are consistently negative and somewhat similar in size irrespective of control group.

As with the MZ results for longer training courses with young men as the comparison group, the BSW estimates for employer-arranged training using the same control group are never positive even though young women have seemingly caught up with young men in labor force participation. Taken together, these results indicate that during the period after maternity leave was extended in Germany, young women lost out in terms of participation in the seemingly most important types of job-related training programs: long training courses and those arranged by the employer.

Effects for Young Women Without Children

Maternity leave extension should affect women of childbearing age even if they currently have no children because they are at risk of leaving the employer for up to three years with a right to return. This risk is enough to make them part of the treatment group. Therefore, to check whether the results so far also apply to women without children, we repeat the estimates given in Table 8, Table 10 and Table 12 with young women who have children excluded (the control groups remain unchanged). These results, presented in Table 13, Table 14 and Table 15, show very similar point estimates and significance levels to those obtained for the full samples, which include young women with children. The only exception, shown in Table 15, is the BSW estimates for different types of training, none of which are statistically significant once young women with children are excluded (cf. Table 12). However, given that the point estimates still remain consistently negative and economically significant, the statistical insignificance may be the result of reduced sample size and correspondingly large standard errors. In sum, there is some evidence that maternity leave extension has reduced job-related training even for young women without children.

Placebo Estimates

The estimates so far seem to suggest that young women receive less job-related training because of the extension of maternity leave from 18 to 36 months, especially when the focus is on white-collar workers, employer-arranged training, and longer training courses. However, the results do sometimes differ depending on the control group chosen, which can be partly explained by trends in labor force participation that overlap with effects of the maternity leave reform. These trends cast doubt on the identifying assumptions of the respective difference-in-differences estimates. For example, when older women are the control group, the identifying assumption is that, in the absence of the reform, the gap in the training incidence between young and older women would have remained constant over time. However, being counterfactual, this identifying assumption (defined for the absence of the reform) is untestable, meaning that we must rely on the placebo test of applying the same estimators to a similar time period without maternity leave extension. Because extensions have been frequent since 1979 and more data are available for recent years, we choose a postreform period for such estimates. However, owing to data availability constraints, we can only use 1997 and 2003 data from the BSW and 2000 and 2004 data from the GSOEP and must exclude the

IAB-BIBB, whose last two waves occurred in 1991 and 1998, and the MZ, whose question on training changed in later years making comparison of outcome variables across time impossible.

The placebo estimation results for the three categories of training in the BSW data are provided in Table 16 for both the full sample and the subsample of white-collar workers in firms with more than 20 employees. These placebo estimates correspond to the results for the extension of maternity leave given in Table 12. It should be noted, however, that whereas in Table 12 the estimates for employer-arranged training are all negative and somewhat similar in magnitude, with half of them being statistically significant, none of the placebo estimates in Table 16 are simultaneously negative and statistically significant. Indeed, in the set of placebo estimates for the full sample, no coefficient is statistically significant, whereas in the set of estimates for white-collar workers in firms with more than 20 employees, all point estimates are positive and the only statistically significant coefficient relates to employer-arranged training when young men are the controls. This comparison provides further support for the hypothesis that young women's participation in training has been held back by the maternity leave extension. That is, although the empirical analysis is admittedly complicated by the overlapping of the maternity leave extension with a trend of increased labor force participation by young women relative to young men, our BSW-based results suggest that the maternity leave extension has at least temporarily put the break on young women's training, especially that of white-collar workers.

The placebo estimates based on the GSOEP also support the assumption that our previous results on reduced training for young women due to extended maternity leave were not spurious. Whereas our GSOEP-based estimates using older women and older women together with younger and older men as controls were significantly negative (see Table 4 and Table 8), the corresponding placebo estimates, given in Table 17, are all positive and insignificantly different from zero. Moreover, as the table shows, these placebo results hold for both the full sample and white-collar workers in firms with more than 20 employees.

5. Conclusion

Even though policies that support the family-work balance are contentious on both sides of the Atlantic, maternity leave that guarantees a post-leave right to return to work is an important component of family policies. Whereas some countries like the United States opt for very short maternity leave periods (i.e., 12 weeks), Germany lies at the other extreme, having extended maternity leave with a right to return to work with the same employer from 18 to 36 months, which ranks in the highest maternity leave durations in industrialized countries. In this paper, we use difference-in-differences estimates to investigate the effect of this extension on the human capital investment of young women workers.

Specifically, drawing on four individual-level datasets that represent West German workers, we measure participation in job-related training as a proxy for human capital investment, taking care to consider long-term trends in labor force participation when interpreting our difference-in-differences estimates using alternative control groups. As in previous literature, we choose older women, young men, and older women together with young and older men as control groups. Some datasets also allow a distinction between longer training or employer-arranged training and short(er) or less important training courses. Finally, we compare placebo estimates for a postreform period with the original point estimates.

Although the estimates vary by control group and are sometimes associated with large standard errors, our results are partly statistically significant and consistent with the hypothesis that long periods of maternity leave harm young working women in terms of lower participation in job-related training. This finding is especially true for longer training courses and employer-arranged training and if we restrict the sample to white-collar workers in larger firms. Taken together with extant findings on extended maternity leave in European countries, our results point to negative economic consequences of protective measures like maternity leave of up to three years (as in Germany) for all young working women, even those without children. These negative effects must be weighed against the potential job security benefits for those who become mothers and the potential benefits for their children. However, as Dustmann and Schönberg's (2007) regression discontinuity estimates illustrate, this latter may be close to zero.

References:

Barron, J.M., D.A. Black und M.A. Loewenstein (1993), 'Gender Differences in Training, Capital, and Wages', *Journal of Human Resources*, **28**, 343-364.

Becker, G. (1962), 'Investment in Human Capital: A Theoretical Analysis', *Journal of Political Economy*, **70**, 9-49.

Bertrand, M., E. Duflo und S. Mullainathan (2004), 'How Much Should We Trust Differences-in-Differences?', *Quarterly Journal of Economics*, **119**, 249-275.

DiNardo, J. and J.-S. Pischke (1997), 'The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?', *Quarterly Journal of Economics*, **112**, 291-303.

Dustmann, Ch. and U. Schönberg (2007), 'The Effect of Expansions in Leave Coverage on Children's Long-Term Outcomes', University College London and University of Rochester, NY, mimeo.

Green, F. (1991), 'Sex Discrimination in Job-Related Training', *British Journal of Industrial Relations*, **29**, 295-304.

Gustafsson, S.S., C.M.M.P. Wetzels, J.D. Vlasblom and S. Dex (1996), 'Women's Labor Force Transitions in Connection with Children: A Panel Data Comparison Between Germany, Sweden and Great Britain', *Journal Population Economics*, **9**, 223-246.

Gruber, J. (1994), 'The Incidence of Mandated Maternity Benefits', *American Economic Review*, **84**, 622-641.

Hashimoto, M. (1981), 'Firm-Specific Human Capital as a Shared Investment', *American Economic Review*, **71**, 475-482.

Hashimoto, M., R. Percy, T. Schoellner and B.A. Weinberg (2004), 'The Long and Short of It: Maternity Leave Coverage and Women's Labor Market Outcomes', IZA Discussion Paper No. 1207, Bonn.

Klerman, J.A. und A. Leibowitz (1990), 'Child Care and Women's Return to Work After Childbirth', *American Economic Review*, **80**, 284-288.

Kreyenfeld, M. (2001), 'Employment and Fertility – East Germany in the 1990s', Rostock University, doctoral thesis.

Kuckulenz, A. (2006), 'Continuing Vocational Training in Germany – A Comparative Study Using 3 German Data Set', ZEW Discussion Paper No. 06-024, Mannheim.

Lai, Y.-Ch. and S. Masters (2005), 'The Effects of Mandatory Maternity and Pregnancy Benefits on Women's Wages and Employment in Taiwan, 1984-1996', *Industrial and Labor Relations Review*, 58, 274-281.

Lalive, R. und J. Zweimüller (2005), 'Does Parental Leave Affect Fertility and Return-to-Work? Evidence from a "True Natural Experiment"', IZA Discussion Paper No. 1613, Bonn.

Lazear, E. (1990), 'Job Security Provisions and Employment', *Quarterly Journal of Economics*, **105**, 699-726.

Ondrich, J., C.K. Spiess, Q. Yang und G.G. Wagner (2003), 'The Liberalization of Maternity Leave Policy and the Return to Work after Childbirth in Germany', *Review of Economics of the Household*, **1**, 77-110.

Pischke, J.-S. (2001), 'Continuous Training in Germany', *Journal of Population Economics*, **14**, 523-548.

Royalty, A.B. (1996), 'The Effects of Job Turnover on the Training of Men and Women', *Industrial and Labor Review*, **49**, 506-521.

Ruhm, Ch. J. (1998), 'The Economic Consequences of Parental Leave Mandates: Lessons from Europe, *Quarterly Journal of Economics*, **113**, 285-317.

Schönberg, U. and J. Ludsteck (2007), 'Maternity Leave Legislation, Female Labor Supply, and the Family Wage Gap', IZA Discussion Paper No. 2699, Bonn.

Spitz-Öner, A. (2006), 'Technical Change, Job Tasks and Rising Educational Demands: Looking Outside the Wage Structure', *Journal of Labor Economics*, **24**, 235-270.

Waldfogel, J. (1998), 'The Family Gap for Young Women in the United States and in Britain: Can Maternity Leave make a Difference?', *Journal of Labor Economics*, **16**, 505-545.

Waldfogel, J. (1999), 'The Impact of the Family and Medical Leave Act', *Journal of Policy Analysis and Management*, **118**, 281-302.

Waldfogel, J. and L.M. Berger (2004), 'Maternity Leave and the Employment of New Mothers in the United States', *Journal of Population Economics*, **17**, 331-349.

Weber, A.M. (2004), 'Wann kehren junge Mütter auf den Arbeitsmarkt zurück? Eine Verweildaueranalyse für Deutschland' [When Do Young Mothers Return to the Labor Market, A Duration Analysis for Germany, in German], ZEW Discussion Paper No. 04-08, Mannheim.

Zveglich, Jr., J.E. and Y. van der Meulen Rodgers (2003), 'The Impact of Protective Measures for Female Workers', *Journal of Labor Economics*, 21, 533-555.

Table 1: Increase of Maximum Maternity Leave Duration

Year	Duration	Maternity leave
1979	4 months	Introduction of a 4-months maternity leave, which can be taken in addition to the 14 weeks retention period. Maternity benefits up to 750 deutschmarks (about €375) per month) paid by the government
1986	10 months	Maternity leave can be taken by mother or father. Both are allowed to work for up to 19 hours per week. Demand for maternity leave can be exchanged once between mother and father. Less than 2 percent of men take this opportunity. Parental benefits of 600 deutschmarks (about €300) per month paid for 10 months by the government
1988	12 months	Duration of maternity leave is extended to 12 months. Parental benefits of 600 deutschmarks (about €300) per month paid for 12 months by the government
1989	15 months	Duration of maternity leave is extended to 15 months. Parental benefits of 600 deutschmarks (about €300) per month paid for 15 months by the government
1990	18 months	Duration of maternity leave is extended to 18 months. Parental benefits of 600 deutschmarks (about €300) per month paid for 18 months by the government
1992	36 months	Duration of maternity leave is extended to 36 months. Demand for maternity leave can be exchanged three times between mother and father. Parental benefits of 600 deutschmarks (about €300) per month paid for 24 months by the government

Source: Kreyenfeld (2001).

Table 2: Descriptive Statistics: Training Participation

	1988	1994
BSW All	0.25	0.33
Young Women	0.25	0.30
Older Women	0.18	0.28
Young Men	0.31	0.35
Older Men	0.24	0.35
n	3,112	2,147
	1989	**1995**
MZ All	0.14	0.18
Young Women	0.15	0.20
Older Women	0.09	0.14
Young Men	0.18	0.21
Older Men	0.12	0.17
n	100,711	109,503
	1989	**2000**
GSOEP All	0.30	0.35
Young Women	0.30	0.36
Older Women	0.17	0.33
Young Men	0.36	0.36
Older Men	0.31	0.36
n	2,764	5,639
	1991	**1998**
IAB-BIBB All	0.36	0.44
Young Women	0.33	0.37
Older Women	0.26	0.39
Young Men	0.37	0.39
Older Men	0.39	0.50
n	16,682	17,564

Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 3: Regression Results – Before-After Estimates

	Specification 1	Specification 2	Specification 3	Specification 4
BSW				
Young Women n=1,188	0.045 (0.030)	0.063** (0.031)	0.056* (0.031)	0.057* (0.031)
Older Women n=1,016	0.097*** (0.029)	0.090*** (0.029)	0.086*** (0.029)	0.088*** (0.029)
Young Men n=1,405	0.048* (0.028)	0.049* (0.030)	0.062** (0.029)	0.061** (0.029)
Older Men n=1,456	0.103*** (0.026)	0.089*** (0.027)	0.097*** (0.026)	0.101*** (0.027)
MZ				
Young Women n=50,237	0.046*** (0.003)	0.039*** (0.003)	0.038*** (0.003)	0.036*** (0.003)
Older Women n=39,838	0.052*** (0.003)	0.045*** (0.003)	0.043*** (0.003)	0.043*** (0.003)
Young Men n=61,257	0.033*** (0.003)	0.025*** (0.003)	0.022*** (0.003)	0.022*** (0.003)
Older Men n=58,882	0.056*** (0.003)	0.048*** (0.003)	0.045*** (0.026)	0.045*** (0.027)
GSOEP				
Young Women n=1,716	0.040 (0.030)	0.016 (0.030)	0.008 (0.029)	0.002 (0.030)
Older Women n=1,849	0.179*** (0.025)	0.138*** (0.025)	0.127*** (0.024)	0.128*** (0.024)
Young Men n=2,175	0.003 (0.029)	-0.029 (0.029)	-0.019 (0.028)	-0.004 (0.028)
Older Men n=2,539	0.053** (0.025)	0.020 (0.023)	0.038* (0.023)	0.039* (0.023)
IAB-BIBB				
Young Women n=7,513	0.036** (0.012)	0.015 (0.012)	0.012 (0.012)	0.012 (0.012)
Older Women n=6,823	0.136*** (0.012)	0.116*** (0.012)	0.109*** (0.011)	0.104*** (0.012)
Young Men n=9,560	0.022* (0.011)	-0.003 (0.011)	-0.002 (0.011)	0.006 (0.011)
Older Men n=10,072	0.118*** (0.011)	0.098*** (0.011)	0.088*** (0.010)	0.085*** (0.010)

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. The specifications are distinguished by the set of control variables. Specification 1 includes no controls, specification two adds age, age squared, dummy variables for high school (A-level, *Abitur*) and tertiary degrees, specification three adds to these dummy variables for full-time employment, white-collar job and civil-service employment. Specification 4 extends the set of control variables further by adding dummy variables for being married and having children.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 4: Difference-in-Differences Estimates – Older Women as Control Group

	Specification 1	Specification 2	Specification 3	Specification 4	Relative deviation
BSW n=2,204	-0.052 (0.042)	-0.027 (0.042)	-0.030 (0.042)	-0.033 (0.042)	-0.13
MZ n=90,075	-0.007 (0.005)	-0.006 (0.005)	-0.005 (0.005)	-0.009* (0.005)	-0.06
GSOEP n=3,508	-0.136*** (0.039)	-0.128*** (0.038)	-0.127*** (0.038)	-0.135*** (0.038)	-0.38
IAB-BIBB n=14,336	-0.100*** (0.017)	-0.101*** (0.017)	-0.099*** (0.016)	-0.100*** (0.017)	-0.30

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. The specifications are distinguished by the set of control variables. Specification 1 includes no controls, specification two adds age, age squared, dummy variables for high school (A-level, *Abitur*) and tertiary degrees, specification three adds to these dummy variables for full-time employment, white-collar job and civil-service employment. Specification 4 extends the set of control variables further by adding dummy variables for being married and having children.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 5: Difference-in-Differences Estimates – Young Men as Control Group

	Specification 1	Specification 2	Specification 3	Specification 4	Relative deviation
BSW n=2,593	-0.003 (0.041)	-0.009 (0.041)	-0.016 (0.041)	-0.017 (0.041)	-0.07
MZ n=111,494	0.013*** (0.005)	0.011** (0.005)	0.016*** (0.005)	0.018*** (0.005)	0.12
GSOEP n=3,806	0.042 (0.042)	0.045 (0.041)	0.043 (0.040)	0.042 (0.040)	0.12
IAB-BIBB n=17,073	0.014 (0.017)	0.006 (0.016)	0.014 (0.016)	0.012 (0.016)	0.04

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. The specifications are distinguished by the set of control variables. Specification 1 includes no controls, specification two adds age, age squared, dummy variables for high school (A-level, *Abitur*) and tertiary degrees, specification three adds to these dummy variables for full-time employment, white-collar job and civil-service employment. Specification 4 extends the set of control variables further by adding dummy variables for being married and having children.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 6: Difference-in-Difference-in-Differences Estimates – Older Women, Young and Older Men as Control Groups

	Specification 1	Specification 2	Specification 3	Specification 4	Relative deviation
BSW n=5,065	-0.003 (0.057)	-0.013 (0.057)	-0.011 (0.056)	-0.013 (0.056)	-0.05
MZ n=210,214	0.016** (0.006)	0.012** (0.006)	0.018*** (0.006)	0.018*** (0.006)	0.12
GSOEP n=8,146	-0.084 (0.056)	-0.074 (0.054)	-0.058 (0.053)	-0.055 (0.052)	-0.15
IAB-BIBB n=33,968	-0.004 (0.023)	-0.016 (0.023)	-0.011 (0.022)	-0.012 (0.022)	-0.04

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively. The specifications are distinguished by the set of control variables. Specification 1 includes no controls, specification two adds age, age squared, dummy variables for high school (A-level, *Abitur*) and tertiary degrees, specification three adds to these dummy variables for full-time employment, white-collar job and civil-service employment. Specification 4 extends the set of control variables further by adding dummy variables for being married and having children.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 7: Training Participation for Subgroups

	Blue-collar worker	White-collar worker	White-collar worker in firms with more than 20 employees	White-collar worker in firms with less than 20 employees
BSW	0.12	0.33	0.35	0.21
MZ	0.07	0.18	n.a.	n.a.
GSOEP	0.13	0.41	0.45	0.20
IAB / BIBB	0.20	0.44	0.48	0.29

Note: Figures refer to the survey years before the reform: 1988 (BSW), 1989 (GSOEP, MZ) and 1991 (IAB-BIBB).
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 8: Estimates for Total Sample vs. Sample of White-Collar Workers:

	DiD Control group: Older Women	DiD Control group: Young Men	DiDiD Control group: Older Women and All Men
BSW			
Full Sample	-0.033 (0.042)	-0.017 (0.041)	-0.013 (0.056)
n	2,204	2,593	5,065
White-collar workers in firms with more than 20 employees	-0.040 (0.058)	-0.016 (0.062)	-0.065 (0.082)
n	1,378	1,388	2,870
MZ			
Full Sample	-0.009* (0.005)	0.018*** (0.005)	0.018*** (0.006)
n	90,075	111,494	210,214
White-collar workers	-0.014** (0.006)	0.017*** (0.007)	0.021** (0.009)
n	69,452	69,891	133,850
GSOEP			
Full Sample	-0.135*** (0.038)	0.042 (0.040)	-0.055 (0.052)
n	3,508	3,806	8,146
White-collar workers in firms with more than 20 employees	-0.193*** (0.054)	0.066 (0.058)	-0.137* (0.076)
n	3,093	2,713	6,631
IAB-BIBB			
Full Sample	-0.100*** (0.017)	0.012 (0.016)	-0.012 (0.022)
N	14,336	17,073	33,968
White-collar workers in firms with more than 10 employees	-0.131*** (0.024)	0.006 (0.024)	-0.049 (0.032)
n	8,448	8,582	18,216

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 9: Training With Different Lengths – MZ

	Job-related Training (all)		Job-related Training (longer than 1 month)		Job-related Training (longer than 6 months)	
	Before (1989)	After (1995)	Before (1989)	After (1995)	Before (1989)	After (1995)
All	0.14	0.18	0.06	0.06	0.03	0.04
Young Women	0.15	0.20	0.07	0.07	0.04	0.05
Older Women	0.09	0.14	0.03	0.04	0.01	0.02
Young Men	0.18	0.21	0.09	0.09	0.05	0.06
Older Men	0.12	0.17	0.04	0.04	0.01	0.02
n	100,711	109,503	100,711	109,503	100,711	109,503

Source: Mikrozensus (MZ); own calculations.

Table 10: Results for Training With Different Lengths – MZ

Full Sample	**DiD** Control group: Older Women	**DiD** Control group: Young Men	**DiDiD** Control group: Older Women and All Men
Job-related Training (all)	-0.009* (0.005)	0.018*** (0.005)	0.018*** (0.006)
Relative deviation	-0.06	0.12	0.12
Job-related Training (longer than 1 month)	-0.009*** (0.003)	0.001 (0.003)	-0.003 (0.004)
Relative deviation	-0.13	0.01	-0.04
Job-related Training (longer than 6 months)	-0.004* (0.002)	0.000 (0.003)	-0.002 (0.003)
Relative deviation	-0.10	0.00	-0.05
n	90,075	111,494	210,214
White-collar Workers			
Job-related Training (all)	-0.014** (0.006)	0.017*** (0.007)	0.021** (0.009)
Relative deviation	-0.08	-0.09	-0.12
Job-related Training (longer than 1 month)	-0.010*** (0.004)	-0.002 (0.005)	-0.004 (0.006)
Relative deviation	-0.13	-0.03	-0.05
Job-related Training (longer than 6 months)	-0.005* (0.003)	-0.002 (0.004)	-0.001 (0.004)
Relative deviation	-0.10	-0.04	-0.02
n	69,452	69,891	133,850

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Mikrozensus (MZ); own calculations.

Table 11: Different Types of Training - BSW

	Job-related Training (general)		Job-related Training (no costs for participants)		Job-related Training (arranged by employer)	
	Before (1988)	After (1994)	Before (1988)	After (1994)	Before (1988)	After (1994)
All	0.25	0.33	0.19	0.26	0.14	0.19
Young Women	0.25	0.30	0.18	0.22	0.13	0.15
Older Women	0.18	0.28	0.13	0.23	0.09	0.16
Young Men	0.31	0.35	0.22	0.26	0.16	0.22
Older Men	0.24	0.35	0.21	0.29	0.16	0.22
n	3,112	2,147	3,112	2,147	3,112	2,147

Source: Report System Further Education (BSW); own calculations.

Table 12: Results for Different Types of Training - BSW

Full Sample	DiD Control group: Older Women	DiD Control group: Young Men	DiDiD Control group: Older Women and All Men
Job-related Training (general)	-0.033 (0.042)	-0.017 (0.041)	-0.013 (0.056)
Relative deviation	-0.13	-0.07	-0.05
Job-related Training (without costs for participants)	-0.041 (0.039)	-0.008 (0.038)	-0.030 (0.053)
Relative deviation	-0.23	-0.04	-0.17
Job-related Training (arranged by employer)	-0.049 (0.033)	-0.059* (0.034)	-0.069 (0.047)
Relative deviation	-0.38	-0.45	-0.53
n	2,204	2,593	5,065
White-collar workers in firms with more than 20 employees			
Job-related Training (general)	-0.040 (0.058)	-0.016 (0.062)	-0.065 (0.082)
Relative deviation	-0.13	-0.05	-0.20
Job-related Training (without costs for participants)	-0.074 (0.055)	-0.032 (0.059)	-0.129* (0.078)
Relative deviation	-0.32	-0.14	-0.56
Job-related Training (arranged by employer)	-0.098** (0.047)	-0.085 (0.053)	-0.157** (0.071)
Relative deviation	-0.58	-0.50	-0.92
n	1,378	1,388	2,870

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Report System Further Education (BSW); own calculations.

Table 13: Estimates for Young Women Without Children – Full Sample vs. Sample of White-Collar Workers

	DiD Control group: Older Women	DiD Control group: Young Men	DiDiD Control group: All Men and Older Women
BSW			
Full Sample	-0.050 (0.049)	-0.028 (0.049)	-0.018 (0.062)
n	1,712	2,101	4,568
White-collar workers in firms with more than 20 employees	-0.028 (0.066)	-0.009 (0.070)	-0.042 (0.088)
n	1,106	1,116	2,598
MZ			
Full Sample	-0.003 (0.005)	0.023*** (0.005)	0.025*** (0.007)
n	73,257	94,676	193,396
White-collar workers	-0.008 (0.007)	0.020*** (0.007)	0.027*** (0.009)
n	57,182	57,621	121,580
SOEP			
Full Sample	-0.168*** (0.044)	0.007 (0.046)	-0.088 (0.057)
n	2,972	3,270	7,610
White-collar workers in firms with more than 20 employees	-0.243*** (0.060)	-0.001 (0.066)	-0.173** (0.083)
n	1,735	1,647	4,106
IAB / BIBB			
Full Sample	-0.110*** (0.019)	0.006 (0.019)	-0.018 (0.024)
n	11,785	14,523	31,419
White-collar workers in firms with more than 10 employees	-0.140*** (0.026)	0.002 (0.026)	-0.045 (0.034)
n	7,102	7,236	16,871

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Report System Further Education (BSW); Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); Qualification and Careers (IAB-BIBB); own calculations.

Table 14: Estimates for Young Women Without Children – Results for Training With Different Lengths – MZ

	DiD	DiD	DiDiD
	Control group:	Control group:	Control group:
Full Sample	Older Women	Young Men	Older Women and All Men
Job-related Training	-0.003	0.023***	0.025***
(all)	(0.005)	(0.005)	(0.007)
Relative deviation	-0.02	0.13	0.14
Job-related Training	-0.014***	-0.006	-0.008*
(longer than 1 month)	(0.004)	(0.004)	(0.005)
Relative deviation	-0.16	-0.07	-0.09
Job-related Training	-0.007**	-0.005	-0.005
(longer than 6 months)	(0.003)	(0.003)	(0.004)
Relative deviation	-0.14	-0.10	-0.10
n	73,257	94,676	193,396
White-collar Workers			
Job-related Training	-0.008	0.020***	0.027***
(all)	(0.007)	(0.007)	(0.009)
Relative deviation	-0.04	0.10	0.14
Job-related Training	-0.015***	-0.010*	-0.009
(longer than 1 month)	(0.004)	(0.005)	(0.006)
Relative deviation	-0.15	-0.10	-0.09
Job-related Training	-0.008**	-0.007	-0.004
(longer than 6 months)	(0.003)	(0.004)	(0.005)
Relative deviation	-0.13	-0.12	-0.07
n	57,182	57,621	121,580

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Mikrozensus (MZ); own calculations.

Table 15: Estimates for Young Women Without Children – Results for Different Types of Training - BSW

	DiD	**DiD**	**DiDiD**
	Control group:	Control group:	Control group: Older Women
Full Sample	Older Women	Young Men	and All Men
Job-related Training (general)	-0.050 (0.049)	-0.028 (0.049)	-0.018 (0.062)
Relative deviation	-0.17	-0.10	-0.06
Job-related Training (without costs for participants)	-0.053 (0.046)	-0.017 (0.046)	-0.037 (0.058)
Relative deviation	-0.24	-0.08	-0.17
Job-related Training (arranged by employer)	-0.033 (0.040)	-0.048 (0.040)	-0.056 (0.052)
Relative deviation	-0.25	-0.37	-0.43
n	1,712	2,101	4,568
White-collar Workers			
Job-related Training (general)	-0.028 (0.066)	-0.009 (0.070)	-0.042 (0.088)
Relative deviation	-0.08	-0.03	-0.12
Job-related Training (without costs for participants)	-0.075 (0.062)	-0.033 (0.066)	-0.125 (0.083)
Relative deviation	-0.29	-0.13	-0.48
Job-related Training (arranged by employer)	-0.062 (0.056)	-0.061 (0.061)	-0.124 (0.077)
Relative deviation	-0.34	-0.34	-0.69
n	1,106	1,116	2,598

Note: *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
Source: Report System Further Education (BSW); own calculations.

Table 16: Placebo Tests – BSW

Full Sample	**DiD** Control group: Older Women	**DiD** Control group: Young Men	**DiDiD** Control group: Older Women and All Men
Job-related Training (general)	-0.017 (0.051)	-0.014 (0.054)	-0.091 (0.071)
Job-related Training (without costs for participants)	-0.019 (0.051)	0.003 (0.053)	-0.096 (0.070)
Job-related Training (arranged by employer)	0.060 (0.047)	0.063 (0.051)	-0.016 (0.067)
n	1,818	1,660	3,739
White-collar workers in firms with more than 20 employees			
Job-related Training (general)	0.028 (0.073)	0.115 (0.082)	0.040 (0.105)
Job-related Training (without costs for participants)	0.020 (0.073)	0.089 (0.084)	0.002 (0.106)
Job-related Training (arranged by employer)	0.049 (0.068)	0.177** (0.083)	0.082 (0.101)
n	1,052	757	2,008

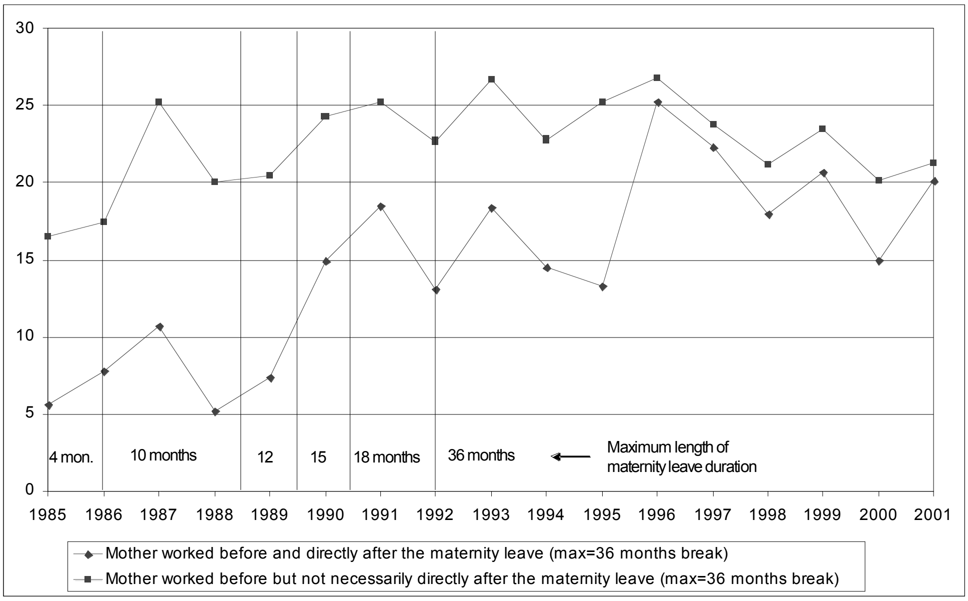
Note: *, ** and *** denote significance at the 10 %, 5 % and 1 % level, respectively
Source: Report System Further Education (BSW); own calculations.

Table 17: Placebo Tests – GSOEP

Full Sample	**DiD** Control group: Older Women	**DiD** Control group: Young Men	**DiDiD** Control group: Older Women and All Men
Job-related Training (general)	0.045 (0.041)	0.061 (0.044)	0.023 (0.054)
n	4,232	3,782	9,426
White-collar workers in firms with more than 20 employees			
Job-related Training (general)	0.059 (0.057)	0.068 (0.063)	0.033 (0.078)
n	2,478	2,003	5,207

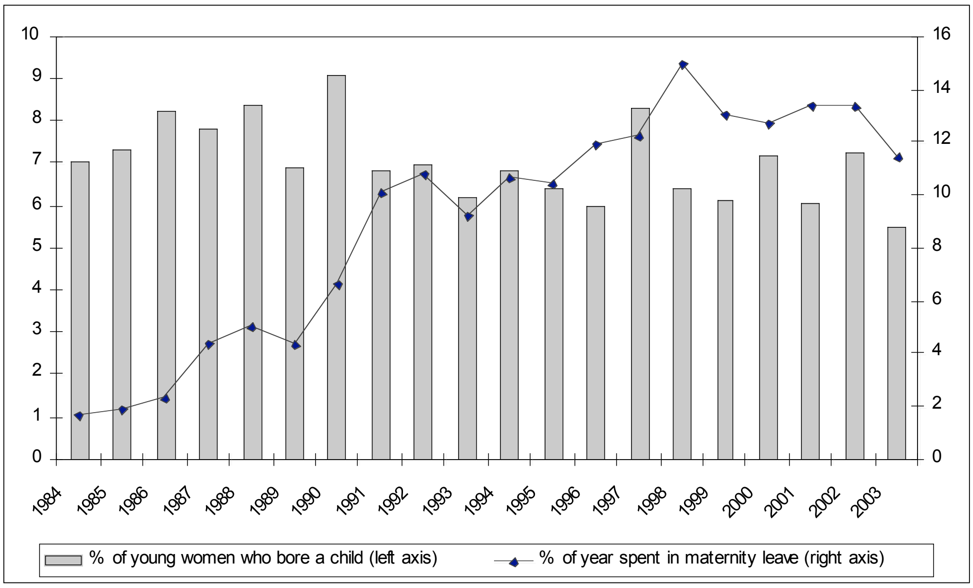
Note: *, ** and *** denote significance at the 10 %, 5 % and 1 % level, respectively.
Source: German Socio-Economic Panel (GSOEP); own calculations.

Figure 1: Average Length of Maternity Leave Taken



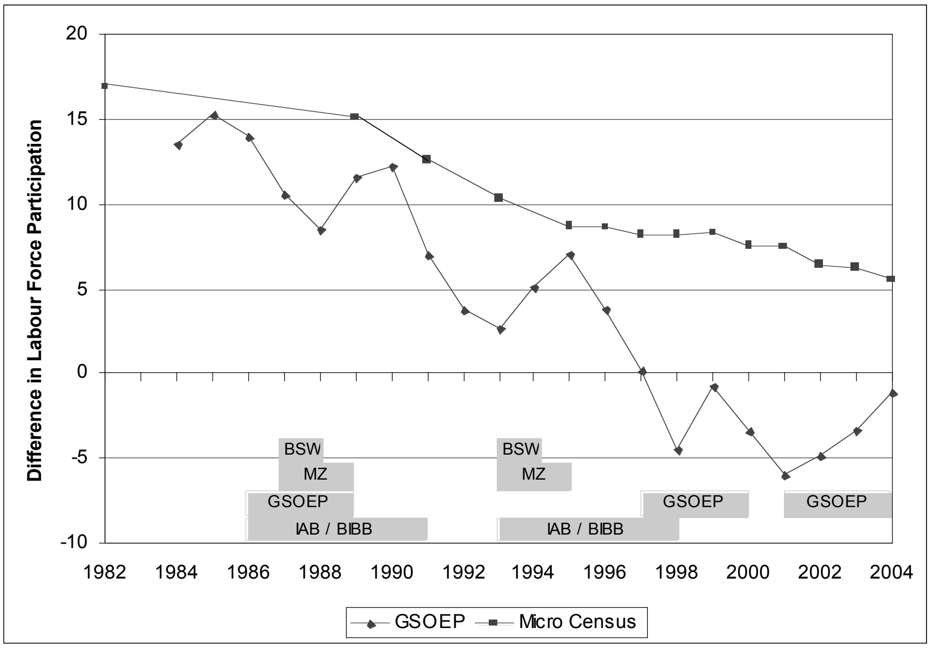
Note: All durations longer than 36 months were censored to 36 months. The length of maternity leave is measured in months for women between 20 and 35 years of age who started their maternity leave in the year before the interview. In the top line, we add the durations of official maternity leave taken and post maternity leave career breaks, which are common in Germany. The lower line only considers official maternity leave for mothers who return to the labor market directly after their official maternity leave.
Source: German Socio-Economic Panel (GSOEP); own calculations.

Figure 2: Young Women's Labor Force Participation and Birth Rates



Note: These results refer to all women between 20 and 35 years. Percentage rate of year spent in maternity leave gives an idea of how long young women, on average, are absent due to maternity leave each year.
Source: German Socio-Economic Panel (GSOEP); own calculations.

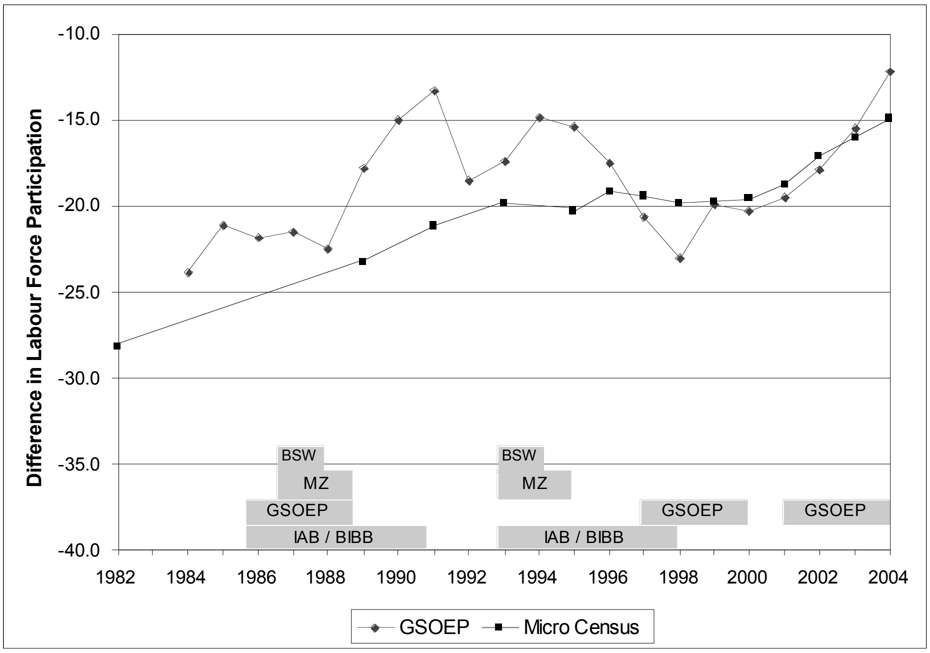
Figure 3: **Difference Between Young and Older Women's Labor Force Participation – Full-time Equivalents**



Note: The boxes at the bottom of the graphs indicate the event windows referred to in the training questions in the respective surveys. As mentioned in the text, the BSW refers to job-related training in the previous year, whereas the MZ, GSOEP and IAB-BIBB data refer to the previous two, three and five years, respectively.

Source: Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); own calculations.

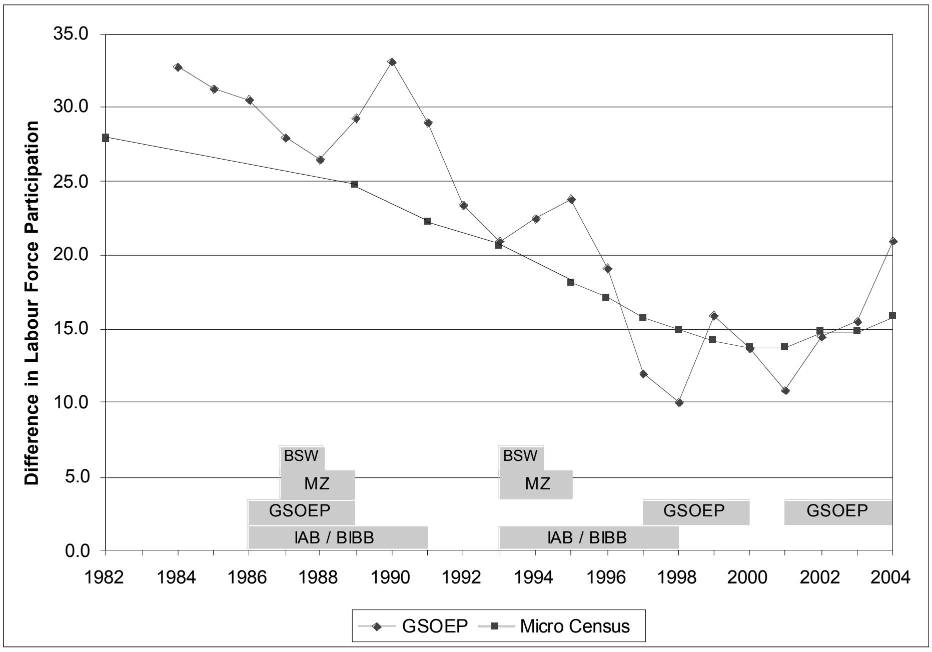
Figure 4: Difference Between Young Women's and Young Men's Labor Force Participation – Full-time Equivalents



Note: The boxes at the bottom of the graphs indicate the event windows referred to in the training questions in the respective surveys. As mentioned in the text, the BSW refers to job-related training in the previous year, whereas the MZ, GSOEP and IAB-BIBB data refer to the previous two, three and five years, respectively.

Source: Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); own calculations.

Figure 5: Difference in Difference Young and Older Persons' Labor Force Participation Between Men and Women – Full-time Equivalents



Note: The boxes at the bottom of the graphs indicate the event windows referred to in the training questions in the respective surveys. As mentioned in the text, the BSW refers to job-related training in the previous year, whereas the MZ, GSOEP and IAB-BIBB data refer to the previous two, three and five years, respectively.
Source: Mikrozensus (MZ); German Socio-Economic Panel (GSOEP); own calculations.