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Parental leave regulations, mothers' labor force attachment and fathers' childcare involvement: evidence from a natural experiment

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Abstract In 2007, Germany implemented a generous parental leave regulation in order to make parenthood more attractive and more compatible with a working career, especially for mothers. We evaluate the reform using a natural experiment that compares outcomes of parents with children born shortly after and before the coming into effect of the law, and find a significant decrease in mothers' employment probability during the 12 months after giving birth, and an increase in mothers' employment probability after the transfer expires. The implementation of two daddy months is currently not reflected in significant changes in fathers' time devoted to childcare.

Keywords Parental leave · Natural experiment · Female labor market participation

JEL Classification H31 · J13 · J18

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1 Introduction

Most OECD countries have been facing low and decreasing birth rates for the last decades. To counteract this trend towards an ever aging and shrinking population, several countries introduced parental leave regulations that intend to make parenthood more attractive and more compatible with a working career, especially for women. In general, the core element of such regulations is a transitory financial transfer to parents of newborn children. Some countries (e.g., Austria and France) offer flat rate transfers, other countries (e.g., Canada, Sweden, and Norway) offer parental leave transfers that depend on parents' labor earnings in the period before the birth of the child. The latter type of regulation incorporates the opportunity costs implied for parents who leave the labor force for some time to take care of their child. Several countries also introduced specific "daddy months", in order to incentivize fathers to also participate in childcare.

The empirical literature has shown for several countries that extensions in paid or unpaid leave delay maternal labor market re-entry, and that maternal labor market re-entry highly concentrates to the period after expiry of paid or unpaid parental leave (e.g., Rønsen and Sunderström 2002; Baker and Milligan 2008; Schönberg and Ludsteck 2008; Lalive and Zweimüller 2009; Hanratty and Trzcinski 2009). In addition, the introduction of parental leave options that are specifically designed for fathers (the "daddy months") has been shown to lead to an increase in fathers' leave-taking. At the same time, few fathers decide to take more leave than the minimum amount of time provided by the regulation (for Norway see Solli 2009, for Sweden see Ekberg et al. 2005). Whether increased leave-taking of fathers also contributes to fathers' involvement in childcare, however, is still an open question. For example, Ekberg et al. (2005) do not find any effect on long-term involvement of fathers, while for the US Nepomnyaschy and Waldfogel (2007) find that fathers who take longer leave are more involved in childcare activities later on.

Germany took up a system of parental leave benefit, the so-called *Elterngeld*, on January 1st 2007, replacing a much less generous system called *Erziehungsgeld*. The new Elterngeld offers a 67% replacement rate of previous net labor earnings (from employment or self-employment) for either father or mother for up to 12 months *postpartum*. If both father and mother participate, they can receive an extra 2 months, and the resulting total leave of 14 months can be freely distributed between the two parents. Single parents can receive a total of 14 months alone. The transfer is truncated at a maximum of 1800 Euros per month, and a flat rate minimum of 300 Euros per month is paid to every parent who has no previous earnings. In contrast, the previous Erziehungsgeld system offered means tested flat rates of 300 Euros per month. These were granted for a longer period of up to 24 months, however.

The new regulation intends to achieve four objectives (cf., German Parliament 2006): first, prevent or smooth the earnings decline for working parents in the first year after birth. Second, increase incentives to re-enter the labor force once the benefit expires, by shifting the (potential) earnings decline from

the time of delivery up to 12 months into the future. Third, make it more attractive for working fathers to stay home for some months and take care of the child. Fourth, make parenthood more attractive in particular for women with a working career, who receive a generous transfer reflecting the labor earnings they forfeit in order to become mothers and take care of the child after birth.

In this paper, we estimate the causal effect of the new regulation on several outcomes reflecting these objectives and contribute to the literature in various ways. First, we estimate the effect of a reduction in maximum paid leave duration on maternal labor market entry. While many countries experienced extensions in leave duration, there have been few reductions only. Thus, evidence of the impact of reducing parental leave duration on labor market participation is scarce.[1] Second, we present estimates for several subgroups of the population. This is of interest because the size of the overall change in the transfer differs between socioeconomic groups, making some women worse off and others better off (despite the reduction in duration). Third, the reform effects are observed for two regions with very different institutional settings concerning public childcare: In East Germany, as a heritage of the previous socialist regime, the supply of public childcare is relatively comprehensive, while in most parts of West Germany it remains scarce to the day. These institutional differences might differentially influence the reform impact on maternal labor market entry. Finally, we contribute to the literature on the effects of daddy months on fathers' involvement in childcare. Compared with other countries in which leave benefits are based on income replacement the German regulation is relatively generous, providing two daddy months.[2] We might therefore expect to be able to measure a clear impact on the father–child relationship, contributing to resolving the previous ambivalent evidence.

The empirical analysis uses a natural experiment created by the coming into effect of the Elterngeld law. The law was put into effect in a rather quick legislative process: In fact, the Elterngeld regulation was decided by the government coalition only in May 2006, and parliament agreed in September 2006. This generates the following natural experiment: At the point in time when those children born shortly after the date of coming into effect of the Elterngeld (January 1st 2007) were conceived, none of the parents knew that by the time their child is born the new regulation would be in force. That is, by comparing the outcomes of parents with children born during the last months of 2006 with outcomes of parents with children born during the first months of 2007, we obtain unbiased estimates of the reform effects. Of course, by comparing these parents, the effects we obtain capture immediate changes

[1]For Austria, Lalive and Zweimüller (2009) show that a reduction in paid leave duration made mothers enter earlier.

[2]For example Norway started with one daddy month in 1993 (Solli 2009) and only later on began to steadily increase the amount of time reserved for fathers up to 12 weeks in 2011. Similarly, in 1995 Sweden reserved one month of total parental leave for fathers and increased the number of daddy months to two from 2002 onwards (Ekberg et al. 2005).

in behavior. Any changes of attitudes that materialize only over the long-run will not be captured.

The estimates are based on unique data from a survey that was specifically designed to cover these two groups of parents around the discontinuity. The empirical results indicate that the reform was effective: the take-up rate of the Elterngeld transfer has been nearly 100%. Mothers are significantly more likely to stay outside the labor force and take care of their child during the first 12 months. This increase in probability is particularly high for mothers who have their first child. At the same time, Elterngeld mothers are more likely to re-enter the labor force or take up work 1.5 years after birth of the child. Parental households with Elterngeld experience a stabilization of their household income, and the probability of receiving other social transfers is reduced, especially among highly educated women. Finally, the take-up rate of fathers increases considerably, which is not reflected in fathers' childcare involvement, however.

These findings potentially have broader implications. Since the Elterngeld is a relatively costly measure—the federal government spent 4.5 Bn. Euros in 2009 and 4.2 Bn. Euros in 2008; spending on Erziehungsgeld was 2.8 Bn. Euros in 2006 and 2.9 Bn. in 2005[3]—it is important to analyze the effects it has on female labor supply in particular. It was an explicit policy objective to subsidize parental time with a newborn child during the first year—at the same time, the new incentive structure will play a role in shaping German mothers' labor force attachment after benefit expiry at 12 months.

The paper is organized as follows. Section 2 gives details on the German Elterngeld reform and the expected behavioral changes it creates. In Section 3 we discuss the design of the natural experiment and the data. Section 4 presents estimates of the reform effects, and Section 5 concludes.

2 Parental leave regulations in Germany

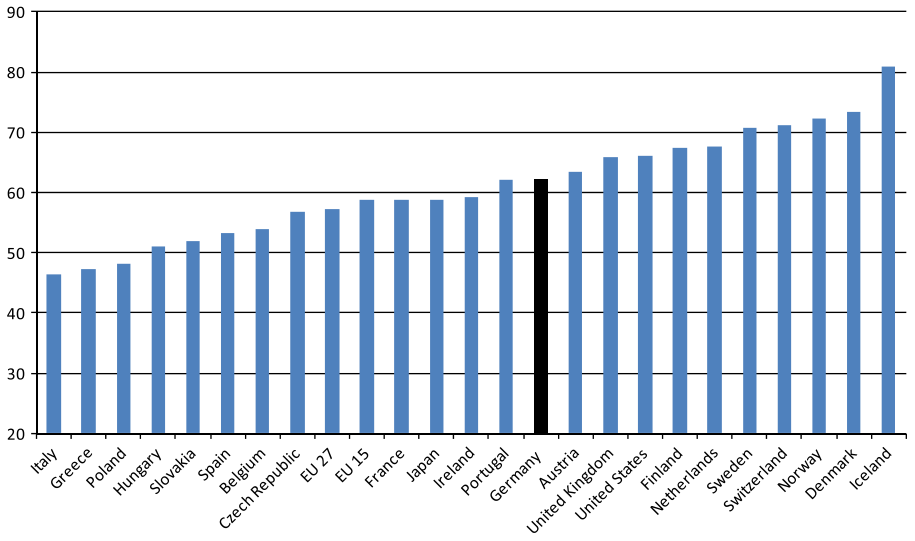
In comparison to other OECD countries Germany has been characterized by relatively generous parental leave regulations with regard to job-protection periods. Starting in 1979, job-protected leave was set at 6 months after birth and continuously extended to up to 36 months after birth (from 1992 on). Job-protection regulations bar employers from dismissing parents during leave, and safeguard the option to return to the same job held before childbirth (or a similar one within the same firm). Since 2001, parents have also been entitled to claim a part-time contract. Besides job-protection, parents receive financial benefits while on leave. Until the end of 2006, the benefit was paid up to a maximum of 24 months after birth and targeted at low-income families.

[3]See annual reports of the Federal Ministry of Finance (www.bundesfinanzministerium.de). Clearly, in 2007, there was an overlap in spending on the two regulations: the newly introduced Elterngeld absorbed 1.8 Bn. Euros, the phase-out of the Erziehungsgeld ingested 2.0 Bn. Euros. In 2008, the final remaining Erziehungsgeld recipients induced federal spending of 0.6 Bn. Euros.

As a consequence of previous extensions in job-protection periods German mothers have been induced to delay their return to work (Schönberg and Ludsteck 2008; Ondrich et al. 1996) and have relatively long out-of-job periods following childbirth (e.g., Gustafsson et al. 1996; Michaud and Tatsiramos 2011; Geyer and Steiner 2007). Also, female employment rates are lower than in most other countries of Northern or Central Europe (Fig. 1).

In light of these developments along with the emerging and expected consequences of demographic change, like an ever increasing number of pensioners relative to the active working population, German policy makers started to think about measures on how to increase the number of individuals contributing to the social security system. Raising the share of working women is seen as one remedy, which might be achieved by changing work–family-related incentives. In addition, proponents of the Elterngeld reform hope that by shortening out-of-job periods of women and thus lowering human capital depreciation while being away from work, the reform might also help reduce gender disparities.

On 1 January 2007 a new parental leave benefit called Elterngeld ("parental money") replaced a previous benefit called Erziehungsgeld ("child-raising benefit"). Whereas the previous benefit was specifically targeted towards low-income families, the new Elterngeld is a much more generous transfer with, in principle, universal coverage. Most importantly, the Elterngeld transfer incorporates the opportunity costs of child-rearing by depending on parental labor earnings in the prepartum period.



Source: Eurostat (2009), http://epp.eurostat.ec.europa.eu

Fig. 1 Female employment rates, 2006

The old Erziehungsgeld benefit in place until 31 December 2006 comprised two options: the first option was to receive 300 Euros per month for a period of up to 24 months, for mother or father. Alternatively, the second option was to receive 450 Euros per month for up to 12 months. The transfer was means tested and in order to be eligible the recipient was required to not be working full-time, i.e. less than 30 h/week. Sixty-six percent of parents were covered by option 1, 10% by option 2, and 24% of parents did not receive the benefit at all.

Since 1 January 2007, the new Elterngeld replaces 67% of previous net labor earnings—i.e., with respect to the average during the 12 months before birth of the child—for up to 12 months after birth of the child. If both father and mother take up the transfer, they can receive an additional 2 months, and the resulting total of 14 months can be freely distributed between the two parents. Single parents receive 14 months of Elterngeld transfer alone. The transfer is truncated at a maximum of 1,800 Euros/month, and a flat rate minimum of 300 Euros/month is paid to every parent who has no or very low labor earnings prepartum. In order to be eligible, recipients are also required to not be working full-time. Since its coming into effect, the take-up rate of the Elterngeld transfer has been nearly 100%. Table 1 illustrates the elements of the old and new regulation.

Given the design of the reform one can expect that the behavioral impact on maternal labor market entry will differ between socioeconomic groups, because of different effective policy changes for these groups depending on certain characteristics—in particular prepartum labor market participation, earnings, and overall household income. Table 2 relates the three groups of mothers generated by the old regime (column 1) to the set of groups they translate into under the new regime (column 2), along with their prototypical sociodemographic composition (column 3). Each of these groups is differentially affected by the regime change. This effective policy change induced by the move from old to new regime is described in column 4 and is composed of two dimensions: higher, lower, or constant transfer amount, and shorter or constant transfer duration.

Depending on the specific policy change facing each of the groups, different behavioral changes regarding maternal labor market participation can be expected (a) during the first 12 months postpartum (i.e., during transfer receipt) and (b) after benefit exhaustion at month 12.[4] For some groups the predicted behavioral change is evident: for instance, for the group of mothers affected by a reduction in the duration of transfer receipt while the size of the monthly transfer remains constant, we would expect to observe (a) no behavioral change during the first 12 months, at least if no inter-temporal income smoothing takes place, and (b) due to the income effect (budget line

[4]To keep the discussion tractable we prescind from including the minor effects that the two "daddy months" might have in determining the exact date when the mother (re-) enters the labor force.

Table 1 Elements of the Elterngeld and Erziehungsgeld regulations

	New Elterngeld benefit	Old Erziehungsgeld benefit		
		Option 1	Option 2	(Option 3)
Monthly benefit	67% of average monthly net income from (self-) employment during 12 months prepartum; minimum 300 Euro, maximum 1800 Euro Mothers without employment history receive 300 Euro	300 Euro, with slight reductions after month 6 depending on means testing	450 Euro, with slight reductions after month 6 depending on means testing	None
Maximum duration	12 + 2 daddy months	24 months	12 months	
Requirements to qualify	Not working more than 30 hours during period of transfer receipt	Not working more than 30 hours during period of transfer receipt Means testing[a]	Not working more than 30 hours during period of transfer receipt Means testing[a]	
Total maximum benefit	3600 to 21600 Euro (+ 600 to 3600 when using daddy months)	7200 Euro	5400 Euro	0 Euro
Proportion of parents covered	Almost 100%	66%	10%	24%

[a]The income threshold (after accounting for several deductibles) was 30,000 Euro/year for couples and 23,000 Euro for single parents and referred to expected income during the period of transfer receipt. In terms of annual gross income this corresponds to approximately 40,400/31,200 Euro, respectively

Table 2 Effective policy changes and expected behavioral changes for mothers

Group in Old Regime	Group in New Regime	Sociodemographic composition	Effective policy change for group	Expected behavioral change
Mothers receiving Erziehungsgeld of 300 Euros for 24 months	Receiving minimum Elterngeld transfer of 300 Euros for 12 months	Mothers without pre-birth employment Inactive mothers with older children (not primipara)	Reduction in the duration of transfer receipt	<= 12 months: No behavioral change > 12 months: Increased rate of labor market entry
	Receiving Elterngeld transfer of 300 to 600 Euros for 12 months	Mothers with pre-birth employment , but low earnings (part-time employment) With older children (not primipara)	Increase in transfer amount offset by decrease in transfer duration: Effectively lower transfer overall	<= 12 months: Lower rate of labor market entry > 12 months: Increased rate of labor market entry
	Receiving Elterngeld transfer of more than 600 Euros for 12 months	Mothers with pre-birth employment, but medium – high earnings First-time mothers (primipara)	Increase in transfer amount overcompensating decrease in transfer duration: Effectively higher transfer overall	<= 12 months: Lower rate of labor market entry > 12 months: Ambiguous. Higher transfer might increase participation (wealth effect); exhaustion of effectively higher transfer might decrease participation (benefit expiry effect).
Mothers receiving Erziehungsgeld of 450 Euros for 12 months	Receiving Elterngeld transfer of 300 to 450 Euros for 12 months	Mothers with pre-birth employment, but low earnings (part-time employment)	Same transfer duration slightly lower or constant transfer amount	<= 12 months: No behavioral change or slightly higher rate of labor market entry > 12 months: No behavioral change
	Receiving Elterngeld transfer of more than 450 Euros for 12 months	Mothers with pre-birth employment, but medium – high earnings	Increase in transfer amount, same transfer duration	<= 12 months: Lower rate of labor market entry > 12 months: Ambiguous. Higher transfer might reduce participation (wealth effect); exhaustion of higher transfer might increase participation (benefit expiry effect).

Table 2 (continued)

Group in Old Regime	Group in New Regime	Sociodemographic composition	Effective policy change for group	Expected behavioral change
Mothers receiving no Erziehungsgeld	Receiving minimum Elterngeld transfer of 300 Euros for 12 months	Mothers without pre-birth employment and with older children (not primipara) High income households	Increase in transfer am	<= 12 months: Lower rate of labor market entry > 12 months: Ambiguous. Higher transfer might reduce participation (wealth effect); exhaustion of higher transfer might increase participation (benefit expiry effect)
	Receiving Elterngeld transfer of more than 300 Euros	Mothers with pre-birth employment First-time mothers (Primipara) High income households	Substantial increase in transfer amount	<= 12 months: Lower rate of labor market entry >12 months: Ambiguous. Higher transfer might reduce participation (wealth effect); exhaustion of higher transfer might increase participation (benefit expiry effect)

"Sociodemographic composition" specifies the type of mothers/households that *typically* compose these groups. There is no one-to-one mapping. "Expected behavioral change" describes the predicted behavior—given the effective policy change specified in column (4)—regarding a) during the first 12 months after birth (i.e., while receiving the Elterngeld transfer) and b) after benefit exhaustion at month 12

shifts downward) an increase in maternal labor market entry after benefit exhaustion at month 12 (row 1 in Table 2).

In other cases, the direction of the expected behavioral change cannot be predicted unambiguously. The group of mothers facing an increase in the transfer amount and a constant transfer duration, for instance, is on the one hand likely to display a lower rate of labor market entry during the first 12 months (row 5) due to the income effect of the higher transfer (upward shift of the budget line). The behavior after benefit expiry on the other hand could go opposite ways. First, the higher transfer received during the first 12 months might reduce the speed of subsequent labor market entry (wealth effect). Second, the exhaustion of the higher transfer might increase the speed of subsequent labor market entry because the discontinuity is stronger than before. This diametrical effect can be referred to as a "benefit expiry effect" and has been observed both in studies of labor market behavior (Card et al. 2007) and maternity leave policies (Schönberg and Ludsteck 2008).

In sum, the expected behavioral changes described in Table 2 point to lower rates of labor market entry during the first 12 months postpartum for most groups of mothers, in particular those with pre-birth labor market participation. For mothers without pre-birth employment, no behavioral change would be expected during the first 12 months. After benefit expiry at 12 months we would expect to see an increase in the rate of return to the labor market for mothers without pre-birth employment participation and/or mothers with older children (not primipara). As regards the behavior at benefit exhaustion of the other groups of mothers the theoretical expectation is ambiguous and it is an empirical question whether the wealth effect or the benefit expiry effect predominate.

As secondary outcomes in addition to employment participation we will also estimate the effects on household income and mothers' probability of receiving social transfers. Finally, because of the newly introduced two daddy months, we expect more fathers to stay home, take care of and devote time to the child.

3 Research design and data

To evaluate the reform effects, we make use of a natural experiment generated by the process of coming into effect of the Elterngeld law and compare parents giving birth during the last months of 2006 (the control group) with parents giving birth during the first months of 2007 (the treatment group receiving the Elterngeld benefit). Similar identification strategies comparing those giving birth shortly before a reform with those giving birth shortly after have been used for example by Schönberg and Ludsteck (2008), Lalive and Zweimüller (2009) and Ekberg et al. (2005). The identification strategy assumes that the month of birth has no impact on the behavior of parents, i.e., without the reform parents in both groups would have behaved similarly.

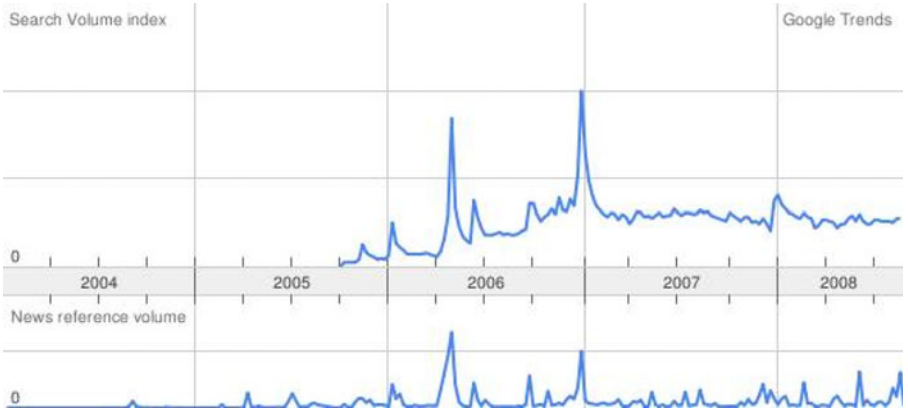


Fig. 2 Google Search Volume Index: Number of "Elterngeld" searches relative to all searches (originating in Germany)

In order to be valid the identification strategy requires that fertility in the treatment and control groups was not influenced by the reform and that mothers did not time births in response to the reform. In fact, the legislative process was rather quick: the government coalition agreed on the main features of the regulation in May 2006 and published the draft law in June 2006. Parliament then passed the Elterngeld law in September 2006, and the reform became effective on 1 January 2007. This timeline implies that at the point in time when those children born shortly after—and before—1 January 2007 were conceived, none of the parents knew that by the time their child is born, the new regulation would be in force.

To investigate the validity of the design, Fig. 2 gives a measure of when and to what extent potential parents could have known about the reform. The figure displays the Google Search Volume Index relating the number of "Elterngeld" searches to the number of total searches originating in Germany. It shows that there is a pronounced peak in May 2006 around the time the government coalition agreed on the cornerstones of the reform. This is the first point in time when there was reason to conjecture that starting with 1 January 2007 parents would receive a new type of parental leave benefit—but note that before the passing of the law in September 2006 this was not definite.[5]

A potential caveat is that parents expected to give birth at the margin might have timed delivery accordingly to fall under either the old or the new regime.

[5]In principle, there is a small probability that some of the parents in our treatment group self-selected into treatment, because once they learned about the possible coming into effect of the Elterngeld transfer in May 2006 they immediately decided to become parents (and otherwise would not have done so), and their child was then born before the end of March 2007. Given the fact, however, that the timing of conception cannot be completely controlled by parents, along with the fact that at the point in time at which parents would have had to act accordingly there was no definite knowledge on whether the reform would indeed be implemented, we think that this is a rather hypothetical scenario.

Tamm (2009) shows that a considerable share of mothers actually delayed deliveries. In particular, compared with the same time period in preceding years the number of births is significantly lower during the last three weeks of 2006 and significantly higher during the first week of 2007. These timing effects are highly selective, as they mostly occur among older women and women working before childbirth.

We use data that were specifically collected to evaluate the reform. That is, in May 2008, we conducted a written survey among parents with children born in first quarter of 2007 (Q1/07, the treatment group) and parents with children born in the last quarter of 2006 (Q4/06, the control group). The survey was implemented in cooperation with two health insurance funds (AOK Rheinland, AOK Sachsen-Anhalt), in order to have a uniform data base for the addresses of treatment and control groups. The full sample contains $N = 1,266$ households, of which $N = 694$ are in the treatment group with delivery in Q1/07, and $N = 572$ in the control group with delivery in Q4/06. Given the evidence on the timing of births in Tamm (2009) and our interest in unbiased reform effects, our preferred specification will leave out those parents giving birth very shortly before and very shortly after 1 January. Since our data contain month of birth but not the exact birthday, the preferred specification compares parents giving birth during February and March 2007 (restricted treatment group) with those giving birth during October and November 2006 (restricted control group). This restricted sample comprises a treatment group of $N = 434$ households, and $N = 388$ control households. Results for the full sample (Q1/07 vs. Q4/06) are provided as sensitivity checks.

Table 3 presents summary statistics for both full and restricted samples, along with t tests on differences-in-means between treatment and control groups. If the natural experiment as described above is valid, then there should be few or no covariate differences between the two groups. Indeed, as Table 3 illustrates, treatment and control groups are balanced in core covariates for both samples, the only significant exceptions being a residual variable describing if fathers' educational attainment is "other or missing", a dummy variable describing if fathers were employed prior to the birth of the child, and a dummy variable for mothers' "low education" in the full sample. We would thus argue that the natural experiment is valid, but will nonetheless present estimates of reform effects adjusting for covariates.

Note that our sample is not necessarily representative of the German population, as the population from which it was drawn is defined as members of the two above-mentioned health insurance funds in two federal states (Nordrhein-Westfalen and Sachsen-Anhalt). Members of these health insurance funds are on average older, and are more likely to have lower income, to have a larger number of children, and to not be self-employed. This, however, constitutes the group for which reform effects are particularly interesting, since they were already targeted by the pre-reform Erziehungsgeld regulation, and are thus the group most likely to simply experience a reduction in benefit duration. Moreover, our main interest does not lie in estimating the average treatment effect for the entire population, but rather in heterogeneous effects

Table 3 Summary statistics: balance of treatment and control groups

Covariate	Mean control group	Mean treatment group	*t* stat on difference-in-means	*N*
Full sample: Q4/06 vs. Q1/07				
Number of children	1.77	1.81	0.78	1,266
Parents cohabitate	0.85	0.88	1.19	1,264
Age of mother	30.10	30.20	0.29	1,244
Age of father	32.70	33.08	0.94	1,072
Low education mother	0.20	0.25	**2.12**	1,266
Medium education mother	0.43	0.39	−1.30	1,266
High education mother	0.17	0.16	−0.61	1,266
University graduate mother	0.09	0.10	0.87	1,266
Other education/missing mother	0.11	0.10	−0.90	1,266
Low education father	0.26	0.29	1.12	1,096
Medium education father	0.35	0.34	−0.36	1,096
High education father	0.09	0.13	*1.72*	1,096
University graduate father	0.10	0.12	0.78	1,096
Other education/missing father	0.19	0.13	**−3.08**	1,096
Foreign mother	0.23	0.22	−0.34	1,249
Employed directly prior to birth, mother	0.46	0.51	*1.73*	1,219
Employed prior to birth, father	0.73	0.65	**−2.58**	934
West Germany	0.63	0.64	0.33	1,266
Net household income prior to birth	1773	1779	0.10	1,035
Transfer receipt mother	0.49	0.45	−1.53	1,266
Transfer receipt father	0.32	0.30	−0.59	1,094
Restricted sample: Oct/Nov 06 vs. Feb/Mar 07				
Number of children	1.80	1.81	0.07	822
Parents cohabitate	0.87	0.89	0.91	821
Age of mother	30.31	29.84	−1.10	810
Age of father	32.66	32.56	−0.19	705
Low education mother	0.21	0.26	*1.73*	822
Medium education mother	0.43	0.37	−1.60	822
High education mother	0.16	0.15	−0.41	822
University graduate mother	0.09	0.11	0.89	822
Other education/missing mother	0.11	0.10	−0.21	822
Low education father	0.28	0.28	−0.04	721
Medium education father	0.34	0.36	0.53	721
High education father	0.10	0.12	0.91	721
University graduate father	0.09	0.11	0.88	721
Other education/missing father	0.19	0.14	**−2.12**	721
Foreign mother	0.21	0.22	0.47	811
Employed directly prior to birth, mother	0.46	0.49	0.85	794
Employed prior to birth, father	0.73	0.65	**−2.14**	621
West Germany	0.64	0.62	−0.64	822
Net household income prior to birth	1889	1754	*−1.68*	671
Transfer receipt mother	0.48	0.44	−1.12	822
Transfer receipt father	0.30	0.29	−0.36	720

Significance levels are indicated in italics (10%-level) and boldface (5%-level). "Transfer receipt" refers to welfare payments and unemployment benefits

by subgroups. As the results in the following section show, average effects on a particular outcome may indeed be insignificant, while subgroup effects are not.

4 Results

Tables 4, 5, 6, 7 and 8 present impact estimates of the Elterngeld reform on a set of outcomes. For the restricted sample (i.e. February/March 2007 and October/November 2006 births) we provide estimates of the average treatment effect and treatment effects by subgroup in Panel A of the tables, each controlling for background characteristics. The subgroups we consider

Table 4 Estimates of reform effects: mothers' employment participation

Panel A	Coefficient	*t* stat	*F* test (effect equal for subgroups)	Base rate
Mother employed 10 months after birth				
Average treatment effect	**−0.065**	−2.38		0.207
Employed directly before birth	**−0.112**	−2.26	3.60	0.371
Not employed before birth	−0.012	−0.73		0.027
Primipara	**−0.150**	−3.57	**9.20**	0.278
Not primipara	0.016	0.46		0.143
West Germany	**−0.095**	−2.75	2.20	0.235
East Germany	−0.012	−0.28		0.157
Mother with high or university education	−0.074	−1.34	0.01	0.244
Mother with low or medium education	**−0.069**	−2.05		0.206
Mother employed 1 year after birth				
Average treatment effect	0.022	0.70		0.273
Employed directly before birth	0.039	0.73	0.34	0.455
Not employed before birth	0.003	0.09		0.074
Primipara	−0.016	−0.33	1.38	0.338
Not primipara	0.059	1.42		0.214
West Germany	−0.025	−0.65	*3.75*	0.289
East Germany	*0.102*	1.92		0.244
Mother with high or university education	0.045	0.72	0.27	0.322
Mother with low or medium education	0.007	0.17		0.271
Mother employed 1.5 years after birth				
Average treatment effect	0.048	1.44		0.348
Employed directly before birth	0.030	0.57	0.33	0.557
Not employed before birth	*0.068*	1.73		0.121
Primipara	0.023	0.45	0.56	0.417
Not primipara	*0.073*	1.67		0.286
West Germany	−0.007	−0.17	**4.57**	0.353
East Germany	**0.143**	2.53		0.339
Mother with high or university education	0.099	1.54	0.99	0.411
Mother with low or medium education	0.023	0.54		0.347
Mother employed 2 years after birth				
Average treatment effect	−0.028	−0.86		0.480
Employed directly before birth	−0.064	−1.31	1.28	0.719
Not employed before birth	0.011	0.25		0.222
Primipara	−0.049	−1.01	0.42	0.583
Not primipara	−0.006	−0.14		0.387
West Germany	−0.020	−0.49	0.10	0.412
East Germany	−0.042	−0.77		0.600
Mother with high or university education	−0.009	−0.14	0.13	0.567
Mother with low or medium education	−0.035	−0.85		0.472

Table 4 (continued)

Panel B	Conditional on background characteristics		Unconditional	
	Coefficient	*t* stat	Coefficient	*t* stat
Mother employed 10 months after birth				
Feb/Mar vs. Oct/Nov	**−0.065**	−2.38	**−0.059**	−2.08
Q1 vs. Q4	**−0.054**	−2.42	−0.040	−1.64
Mother employed 1 year after birth				
Feb/Mar vs. Oct/Nov	0.022	0.70	0.030	0.88
Q1 vs. Q4	0.010	0.37	0.028	0.99
Mother employed 1.5 years after birth				
Feb/Mar vs. Oct/Nov	0.048	1.44	0.054	1.47
Q1 vs. Q4	*0.047*	1.75	**0.063**	2.11
Mother employed 2 years after birth				
Feb/Mar vs. Oct/Nov	−0.028	−0.86	−0.016	−0.41
Q1 vs. Q4	−0.028	−1.06	−0.008	−0.27

Employment status 1.5 years and 2 years after birth reflects expectations and plans, while employment status 10 month and 1 year after birth measures actual behavior. Panel A presents average treatment effects and by subgroup controlling for background characteristics using restricted sample. Base rate refers to average outcome in the control group. Panel B presents average treatment effects for restricted and full sample with and without controlling for background characteristics. Background characteristics include indicators for West Germany, cohabitation, foreign citizenship, the number of children, mother's educational degree and her working status directly prior to birth. Significance levels are indicated in italics (10%-level) and boldface (5%-level)

are mothers employed directly before birth vs. not employed, mothers who have their first child vs. mothers with older children, East vs. West Germany, and mothers with high or university education vs. low or medium education. In addition to this preferred specification we provide estimates of the average treatment effect for several other specifications as a sensitivity check (Panel B of the tables): For the restricted sample without controlling for background characteristics, and for the full sample (i.e., Q1/07 and Q4/06 births) with and without controlling for background characteristics. All estimates are based on OLS/linear probability models.

We first present results for female employment rates, analyzing the reform effect on the timing and structure of mothers' return to the labor force after delivery.[6] Results in Panel A of Table 4 cover four points in time (10 months, 1 year, 1.5 years, and 2 years after birth) and indicate that there is indeed a substantial reform effect on mothers' employment participation. First, we see that the strong incentive created by the reform to stay home during the first 12 months postpartum (recall Table 2) indeed results in a significantly lower

[6]We also checked whether pre-birth labor market attachment was affected by the reform. Neither the probability of ever having worked during the last 12 months before delivery, nor the number of months having worked, nor the probability of having worked directly before delivery (i.e., until maternity protection starts) differs between treatment and control group.

employment rate of mothers in the treatment group at 10 months after birth of the child.[7] Looking at subgroups, we find this effect to be particularly strong for women having their first child and for those who were previously employed—both have significantly and about 11–15 percentage points lower employment rates at 10 months after delivery. These are large effects, as can be seen by comparing the changes with the average employment rates of the control group (given in the last column of Table 2 labeled 'base rate'). The direction of the effect matches the behavioral changes theoretically expected for these groups of mothers.

Second, we see that mothers in the treatment group do not differ from the control group at one year after delivery but then increasingly take up (or return to) work after the Elterngeld transfer expires (measured using the employment status 1.5 years after birth). Note that this refers to the expected employment status, as the interview took place less than 1.5 years after childbirth.[8] Again looking at subgroups, this effect is mostly driven by women in East Germany, women with previous children and women who were not employed directly before birth. For the latter groups, the Elterngeld creates an incentive to take up work after 1.5 years that under the old regulation did not exist (Table 2): the income effect induced by the reduction in transfer duration indeed seems to increase maternal labor market entry. The larger impact among East German women compared with West Germans might be linked to the availability of childcare facilities. The supply of public childcare for children below age 3 is much better in the Eastern regions than in the West (Statistisches Bundesamt 2008; Muehler 2008).[9]

The subgroup analysis at 1.5 years shows that the respective strength of the wealth and benefit expiry effects cannot be disentangled. For the groups of mothers affected most by these diametrical effects—mothers with pre-birth employment and mothers who have their first child—the point estimates are insignificant. Hence, either the effects cancel out or the sample size of our

[7]To estimate employment behavior of women within the first year postpartum it seems appropriate to choose a point in time in the second half of that year. During the first 6 months most mothers are likely to stay with their newborn baby regardless of leave regulations. Focusing thus on the second 6 months to characterize mothers' employment behavior during transfer receipt, the choice of "month 10" is arbitrary. The impact estimates for surrounding months are essentially the same.

[8]If stated expectations differ systematically from actual behavior later on, some of the difference between treatment and control group might also be due to the fact that 1.5 years after childbirth was slightly closer to the time of interview for the control group than for the treatment group.

[9]In addition to the supply of childcare East and West Germany are different with respect to several other factors. For example the overall unemployment rate is higher in the East, average wages are lower, GDP growth was somewhat smaller in 2007 etc. Also, the overall attitude towards maternal employment shortly after childbirth might still differ due to historical reasons (Bredtmann et al. 2009). Under the communist regime in the East it was very common that women reentered the labor market after 12 months or earlier. While we cannot disentangle which of these differences is driving the resulting heterogeneity in behavioral changes, we think that the comprehensive supply of childcare (and perhaps the difference in attitudes) is most likely to be responsible.

Table 5 Estimates of reform effects: household income

Panel A	Coefficient	*t* stat	*F* test (effect equal for subgroups)	Base rate
Change in net household income between the year before and the year after birth (Euros/month)				
Average treatment effect	19.28	0.52		−72.69
Employed directly before birth	*106.92*	1.86	**5.18**	−301.05
Not employed before birth	−62.90	−1.32		135.22
Primipara	47.46	0.83	0.53	−138.43
Not primipara	−7.11	−0.15		−13.45
West Germany	52.78	1.04	1.45	−125.70
East Germany	−34.98	−0.67		12.97
Mother with high or university education	*122.58*	1.69	2.48	−210.22
Mother with low or medium education	−13.73	−0.29		−27.73

Panel B	Conditional on background characteristics		Unconditional	
	Coefficient	*t* stat	Coefficient	*t* stat
Change in net household income between the year before and the year after birth (Euros/month)				
Feb/Mar vs. Oct/Nov	19.28	0.52	6.15	0.16
Q1 vs. Q4	−16.02	−0.51	−35.21	−1.06

Panel A presents average treatment effects and by subgroup controlling for background characteristics using restricted sample. Base rate refers to average outcome in the control group. Panel B presents average treatment effects for restricted and full sample with and without controlling for background characteristics. Background characteristics include indicators for West Germany, cohabitation, foreign citizenship, the number of children, mother's educational degree and her working status directly prior to birth. Significance levels are indicated in italics (10%-level) and boldface (5%-level)

data is simply too small to render differences of 2 or 3 percentage points significant.[10]

Third, at around 2 years after birth the difference between treatment and control group becomes insignificant for all subgroups. This indicates that there is a timing effect between the first and second year after delivery, but there is no long-run effect on participation rates.

Panel B of Table 4 provides average treatment effects for the restricted and the full sample with and without controlling for confounding factors. The pattern of all specifications is quite similar and indicates that under the new regulation mothers are indeed more likely to take care of the child during the

[10] Power calculations show that with a sample size of around 400 observations in both treatment and control group and a binary indicator that equals 1 in 35% of cases in the control group, the raw difference between treatment and control group has to be more than 5.5 percentage points in order to become significant at the 10%-level, and almost 7 percentage points for significance at the 5%-level (when not controlling for other characteristics).

Table 6 Estimates of reform effects: probability of receiving social transfers

Panel A	Coefficient	*t* stat	*F* test (effect equal for subgroups)	Base rate
Mother receives social transfers postpartum				
Average treatment effect	*−0.036*	−1.68		0.428
Employed directly before birth	*−0.056*	−1.78	0.82	0.220
Not employed before birth	−0.018	−0.61		0.594
Primipara	*−0.060*	−1.85	1.12	0.392
Not primipara	−0.015	−0.55		0.458
West Germany	−0.029	−1.15	0.17	0.294
East Germany	−0.048	−1.25		0.664
Mother with high or university education	**−0.094**	−2.53	*2.77*	0.265
Mother with low or medium education	−0.017	−0.65		0.472

Panel B	Conditional on background characteristics		Unconditional	
	Coefficient	*t* stat	Coefficient	*t* stat
Mother receives social transfers postpartum				
Feb/Mar vs. Oct/Nov	*−0.036*	− 1.68	*−0.061*	−1.80
Q1 vs. Q4	−0.021	−1.18	**−0.063**	−2.27

Panel A presents average treatment effects and by subgroup controlling for background characteristics using restricted sample. Base rate refers to average outcome in the control group. Panel B presents average treatment effects for restricted and full sample with and without controlling for background characteristics. Background characteristics include indicators for West Germany, cohabitation, foreign citizenship, the number of children, mother's educational degree, her working status directly prior to birth and the receipt of social transfers prior to birth. Significance levels are indicated in italics (10%-level) and boldface (5%-level)

first year after giving birth, while at the same time also being more likely to return to work in the second year.

Next, we discuss the impact of the reform on the financial situation during the first year after birth of the child. Tables 5 and 6 contain impact estimates on household income and receipt of social transfer payments, respectively. In the survey we asked parents for changes in monthly net household income experienced between the year before and the year after childbirth. Table 5 indicates that parents in the treatment group might have experienced income changes (mostly reductions) between the year before and the year after the birth of the child which do not differ from those of the control group. Yet the insignificant overall effect hides that some subgroups of parents in the treatment group actually do experience significant changes. In particular, mothers employed before birth and highly educated mothers experience smaller income reductions after the reform (i.e., the comparison with the control group results in positive coefficients in the table, which are significant at the 10%-level).

Table 6 shows the reform effect on mothers' probability of receiving a social transfer, i.e. welfare payments like *ALG II* (long-term unemployment

Table 7 Estimates of reform effects: fathers' employment participation

Panel B	Conditional on background characteristics		Unconditional		Base rate
	Coefficient	*t* stat	Coefficient	*t* stat	
Father employed 10 months after birth					
Feb/Mar vs. Oct/Nov	0.015	0.89	−0.049	−1.46	0.848
Q1 vs. Q4	0.006	0.47	**−0.055**	−1.97	
Father employed 1 year after birth					
Feb/Mar vs. Oct/Nov	*0.033*	1.87	−0.030	−0.90	0.849
Q1 vs. Q4	*0.026*	1.85	−0.032	−1.20	
Father employed 1.5 years after birth					
Feb/Mar vs. Oct/Nov	0.028	1.14	−0.021	−0.67	0.857
Q1 vs. Q4	0.009	0.47	−0.037	−1.39	
Father employed 2 years after birth					
Feb/Mar vs. Oct/Nov	0.016	0.68	−0.033	−1.08	0.876
Q1 vs. Q4	−0.002	−0.13	*−0.048*	−1.85	

Employment status 1.5 years and 2 years after birth reflects expectations and plans, while employment status 10 month and 1 year after birth measures actual behavior. Panel B presents average treatment effects for restricted and full sample with and without controlling for background characteristics. Background characteristics include indicators for West Germany, cohabitation, foreign citizenship, the number of children, father's educational degree and his working status prior to birth. Significance levels are indicated in italics (10%-level) and boldface (5%-level)

assistance) or *Sozialhilfe* (social assistance). The estimate of the overall effect shows that the Elterngeld reform reduced this probability by slightly less than 4 percentage points. This overall effect is significant at the 10%-level. Results for subgroups indicate that the overall effect is mainly driven by a reduction in welfare receipt of women who have their first child, women who worked before childbirth and by women with higher educational attainment, i.e. those groups of women who on average had higher earnings prior to birth and thus benefit most from the new regulation.

Finally, we analyze the reform impact on fathers' behavior. RWI (2008) shows that in slightly more than 16% of households with newborn children the father receives Elterngeld.[11] However, more than two thirds of these fathers take up the Elterngeld transfer only for the exact 2 months that can be added to the mother's 12 months to obtain the joint maximum transfer period of 14 months. While 2 months is longer than paternal leave in other countries, it is still a rather short period of time and, thus, it does not come as a surprise that we do not find any significant effects on fathers' employment rates in the survey. The estimates presented in Panel B of Table 7 indicate that the Elterngeld had no effect on the employment rates of fathers during the first 2 years after birth of the child, except at 1 year after birth where the point estimate in the preferred specification is slightly positive and significant at the 10%-level. Results of the conditional and the unconditional specifications

[11] Less than 4% of fathers received the old Erziehungsgeld transfer.

are quite different for this set of outcomes, making clear the importance of controlling for fathers' employment status before childbirth. As has been shown in Table 3, there are significant differences in paternal employment already visible prior to birth (note that results for subgroups have not been reported in the table since none of them were significant).

In addition to employment status, the survey also asked respondents about the share that mother and father each allocate to overall childcare at home during the first year after birth. The sum of a mother's and father's share within a household had to add up to 100%. We find that within the treatment group, fathers receiving Elterngeld took over considerably larger shares of childcare than fathers without Elterngeld (45 compared with 22% share of childcare). Results comparing mothers in the treatment group with mothers in the control group, however, show that the share of involvement of their partners in childcare is higher by 2 percentage points only (Table 8). This difference is insignificant (except for mothers with low or medium education). That is, most of the difference between fathers receiving Elterngeld and those

Table 8 Estimates of reform effects: fathers' contribution to childcare

Panel A	Coefficient	*t* stat	*F* test (effect equal for subgroups)	Base rate
Share father contributes to childcare				
Average treatment effect	2.23	1.22		24.34
Mother employed directly before birth	0.73	0.28	0.12	24.61
Mother not employed before birth	1.95	0.80		23.83
Primipara	0.35	0.13	0.86	27.06
Not primipara	3.76	1.54		22.22
West Germany	3.65	1.60	1.10	22.44
East Germany	−0.31	−0.10		28.04
Mother with high or university education	−2.79	−0.95	**4.29**	20.45
Mother with low or medium education	**5.15**	2.13		24.45

Panel B	Conditional on background characteristics		Unconditional	
	Coefficient	*t* stat	Coefficient	*t* stat
Share father contributes to childcare				
Feb/Mar vs. Oct/Nov	2.23	1.22	2.88	1.53
Q1 vs. Q4	2.29	1.57	*2.78*	1.84

Panel A presents average treatment effects and by subgroup controlling for background characteristics using restricted sample. Base rate refers to average outcome in the control group. Panel B presents average treatment effects for restricted and full sample with and without controlling for background characteristics. Background characteristics include indicators for West Germany, cohabitation, foreign citizenship, the number of children, father's educational degree and his working status directly prior to birth. Significance levels are indicated in italics (10%-level) and boldface (5%-level)

who do not might be a selection effect and thus no causal effect of the reform. Having said this, note that our dependent variable is the share of childcare the father takes over, which together with the mother's share adds up to 100%. The insignificance of the difference between treatment and control group might result from a situation where neither fathers nor mothers change behavior. But it might also result from a situation where fathers and mothers both proportionally increase the time with the child. Given the reduced labor market participation of mothers during the first 12 months after birth, the latter might actually be the case.

5 Conclusion

In line with several other OECD countries, Germany recently implemented a generous parental leave regulation in order to make parenthood more attractive and more compatible with a working career, especially for mothers. To this end, the new Elterngeld benefit generally replaces 67% of prepartum net labor earnings for up to 12 months after birth of the child, thus incorporating the opportunity costs of child-rearing. The new Elterngeld replaces a system with lower (flat rate) transfers that were paid for a longer duration, however.

The legislative process through which the Elterngeld reform came into effect took only few months, allowing us to assess reform effects by comparing outcomes of parents whose children were born shortly before and after the coming into force of the law, because at the time of conception parents did not know the reform would be effective by the time their child is born, and hence could not self-select into the treatment group. Using this natural experiment, we base our impact estimates on data specifically collected for this purpose.

We find that the Elterngeld reform is at least partially successful in attaining its objectives. Most importantly, the reform successfully generates incentives for (working) women to significantly reduce employment during the 12 months postpartum and take care of the child, while after the Elterngeld transfer expires employment activity is increased. This general pattern of decreased labor market participation during transfer receipt (i.e., the first 12 months postpartum) and increased labor market participation after benefit expiry, however, seems to be created by differential impacts of the reform on different sociodemographic groups of mothers. During the first 12 months, it is mostly the group of mothers with pre-birth employment and those having their first child who strongly and significantly reduce their employment participation, a result in line with the behavioral incentives created by the Elterngeld regulation. After benefit expiry, it is then mostly the group of mothers without pre-birth employment and those having older children who increase their employment participation. The differential reform effects for East and West Germany—mothers in West Germany lower their employment participation in the first 12 months, East German mothers increase their employment participation after 12 months—are likely induced by the differences in public provision of childcare facilities between the two parts of the country.

In accordance with findings for previous reforms of the parental leave system in Germany regarding job-protection (Schönberg and Ludsteck 2008), we find that the Elterngeld reform does seem to have an impact on the timing of re-entry into the labor market, but has very little or no impact on (planned) long-run participation rates of women.

In addition, results show that highly educated women experience smaller income losses during the first year after birth compared with prepartum income and have a lower probability of receiving welfare payments relative to the old regulation. The effect among highly educated women is probably more pronounced because of higher individual earnings prepartum and higher overall household income (due to assortative mating), which makes highly educated women more likely to experience increases in parental leave benefits during the first 12 months relative to the old regulation.

Finally, fathers seem to be incentivized indeed to take advantage of parental leave benefits. But most men only take 2 months of Elterngeld (RWI 2008). We do not (yet) find that this is reflected in significant changes in paternal employment rates or time devoted to childcare during the first 12 months after birth. This lack of change in fathers' behavior might reflect that we focus on immediate changes and cannot consider changes that only show up after some time of adaption, e.g., by means of a general change of societal attitudes towards fathers' involvement in childcare.

The policy implications that can be derived from our analysis point to a continuation of the policy. Judged against its objectives, the Elterngeld reform works: mothers and fathers increasingly use the first 12 months to be with their child, and the earnings decline for most families is smoothed relative to the previous regulation. As the long-run patterns of these initial findings unfold, it will be seen whether also the mothers with pre-birth employment increasingly return to the labor market after benefit expiry, and whether the political discourse in Germany continues to value parental leave in substantial monetary terms.

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